THE STATE CEMATROPIST

PUBLISHED DUARTERLY AT THE WATED NATICE MATICEDATA CENTER, ASHEVILLE, N.C. W. CODPERATION WITH THE AMERICAN ASSOCIATION OF STATE CLIMATOLOGISTS

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
AL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE
NATIONAL CLIMATIC DATA CENTER



Climatography #20 Update. We are presently 75% through the reprint of the new Climatography #20 series. There are 1900 different stations in all with a projected completion in early March 1985. Upon completion, there will be bound sets made by state containing a newly generated map as well as a station list. One bound set will be provided free to each state as soon as they are available.

1983 CD Annuals. The printing of the revised 1983 CD Annuals is complete. There had been some data problems with the initial run, thus necessitating a rerun and new printing. Subscription copies will be mailed by February 13, 1985.

NCDC/SC Exchange Program. NCDC received applications from a record number (25%) of State Climatologists for the FY-85 Exchange Program. Unfortunately we were unable to secure additional funding to cover this number of applications. Following are a list of those states that were selected to participate this year: Alabama, Colorado, Connecticut, Iowa, Maryland, Montana, New Jersey, South Carolina, and Utah. We would hope that those states not chosen this year will re-submit their applications next year. We greatly appreciate your interest in this program.

Climate Computer (CLICOM) Project. In support of the WMO World Climate Data Program (WCDP), the United States has been asked to take the lead in developing a basic micro-computer system to be deployed in developing countries.

The proposed pilot project concentrates on designing a "turn key" hardware/software system that will allow participating countries to salvage climate data from deteriorating manuscript forms and begin building digital data bases. The focus will be on data management with some rudimentary software to produce summary data.

A properly designed, user friendly system is essential to assure acceptance by participating countries, and will encourage the construction of data bases that can be used as input to a variety of applications programs.

The thrust of this phase is to provide the hardware/software/simplified operations manuals and training needed to get the project underway. Generalized programs, applicable to all types of climate data processing, will be emphasized.

Although the NCDC will have the lead role in this pilot project, advice from NOAA, other governmental agencies, and civilian experts will be solicited. In addition, there will be an oversight committee composed of NCDC, NWS, and WMO experts.

It is important to remember that the principal goal of this phase is to provide a means of digitizing and managing a climate data base which can then be used with confidence as input to follow-on applications programs.

Development - MAPSO. MAPSO (Microcomputer-Aided Paperless Surface Observations) became operational in January with one Pacific Region station, Kahului, Hawaii. At this time digital data have been received, on Apple-formatted diskettes, for the first 20 days of January. The Pacific Region diskettes require some format changes, and we are in the process of making slight modifications to our software to process these data.

Alaskan Region MAPSO will become operational with 14 stations in February. All Alaskan stations are using IBM-PCs for data input and processing.

Operational MAPSO stations will not submit MF1 manuscripts; thus, we have developed an "MF1 clone" on COM to fulfill the NCDC archive requirement. Focal points for this project are Marc Plantico, Dan Manns, and Tom Reek.

Maximum Short Duration Precipitation. Starting with February data, the National Weather Service personnel will no longer compute maximum precipitation. This will be calculated at NCDC by digitizing the First-Order universal rain gauge charts and through the use of newly designed and developed software. The digitization will be done by the Cooperative Data Branch using the Data General Eclipse computer.

Testing of the system is presently being completed using 25 stations from December 1984 and January 1985. The system appears to be running perfectly. Focal point for this project is Catherine Godfrey.

LCD Annual Publication. Tom Reek and Eric Gadberry have been working on this project which has entailed a complete redesign of the publication and the system which produces it. Dynamically labeled and scaled graphs have replaced the narratives on the cover page. The publication has been expanded to eight pages, tables have been redesigned, and the print size expanded. In addition, the microfiche archive product has been designed for optimum readability.

Several of the State Climatologists made some excellent suggestions concerning the content and form of the new LCD Annual while here at NCDC during last year's Exchange Program. A sample of the new LCD Annual appears in this issue of the State Climatologist.

Applied Climatology Workshop. NCDC had hoped to have a short seminar/workshop in conjunction with the 1985 AASC meeting. This idea has died due to a lack of funds. Now we are hoping to put together a 1 or 2 week workshop on Applied Climatology sometime in 1986.

What is needed are your thoughts on what subjects to address, what audience would benefit the most, whether it should be one long course or a series of

New Station Minimum Temperature. No doubt we will learn of many more broken temperature records as the January 1985 weather forms come into the National Climatic Data Center. Certainly we are already aware of the temperatures that we experienced here during the Arctic Outbreak of January 20 and 21. We have continued the old Weather Bureau records for downtown Asheville through a cooperative station on the roof of the Center. The Weather Bureau records began on September 1, 1902, but we also have some older Smithsonian records dating back to 1873. A review of all the records showed that the previous coldest recorded temperature in the Asheville City area was -10°F set during the record outbreak of February 13-14, 1899. The coldest temperature recorded since 1902 was -8°F on December 25, 1983. Both of these records were left far behind when the temperature fell to -17°F on the morning of January 21, 1985. Nearby, Mt. Mitchell set a new state record of -34°F breaking the old record of -29°F set on January 30, 1966.

NEWS FROM THE STATES

TENNESSEE. Mr. Wayne Hamberger is now the Acting Tennessee State Climatologist replacing Mr. Chuck Bach. Chuck's recent promotion in the Tennessee Valley Authority (TVA) necessitated him to vacate his position as State Climatologist. Chuck will still remain in the same office with Mr. Hamberger and therefore, will not be totally removed from any association with the State Climatologist Program. Please address all future correspondence to:

Mr. Wayne Hamberger
Tennessee Valley Authority
310 Evans Building
Knoxville, TN 37902
Phone: 615-632-4222
FTS-856-4222

Welcome to the group Wayne, and thanks Chuck for your help and support over the past years.

OREGON. Dr. Kelly T. Redmond is now the Oregon State Climatologist.

Dr. Redmond had been the assistant SC for the past several years, and will take over for Dr. Allan H. Murphy. We would also like to thank Dr. Murphy for his contributions to the SC program and congratulate Dr. Redmond on the assumption of his new position. Kelly may be reached at the same address and phone number as Dr. Murphy.

NEVADA. The new State Climatological Library was dedicated at the University of Nevada-Reno on November 19th. It is located in the Department of Geography wing of Mackay Science Hall, and is a part of the William D. Phillips Memorial Map and Climatological Library Room. Members of the University administration, Nevada State administration, and the National Oceanic and Atmospheric Administration took part in the ceremony. The public was also invited to view the collection of climate data, including many old handwritten records from the last century, some from long-since-gone mining camps.

NEW STATE PUBLICATIONS OR REPORTS

CLIMATE OF NEVADA - By John W. James Nevada State Climatologist

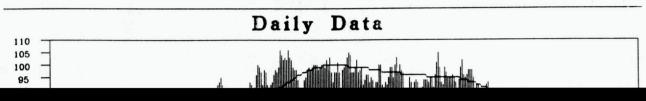
This concise 28-page report describes through both narrative and tabular form the five climatic regions of Nevada.

Paper No. 84-12

1984 ANNUAL SUMMARY WITH COMPARATIVE DATA



TUCSON, ARIZONA
NATIONAL WEATHER SERVICE OFFICE



METEOROLOGICAL DATA FOR 1984

TUCSON, ARIZONA

				t 195 H	TUC	CSON, A	RIZONA	4) r 40									
	LATITUDE: 32 07' N								ms 1 25				AIN WB				
		JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	YEA	1		
	TEMPERATURE OF: Averages																
	-Daily Maximum -Daily Minimum -Monthly -Monthly Dewpt. Extremes	64.4 39.1 51.8 31.1	68.6 38.7 53.7 20.0	76.0 44.9 60.5 19.7	78.5 49.4 64.0 26.3	96.1 63.6 79.9 32.8	97.1 69.0 83.1 41.3	96.6 71.7 84.2 60.9	94.5 71.2 82.9 60.8	93.5 69.4 81.5 51.8					0.0 0.0 0.0 0.0		
	-Highest -Date -Lowest -Date	76 29 28 20	76 29 28 18	85 20 34 6	95 16 37 2	106 28 50	103 23 63 8	105 5 67 21	105 30 67 19	102 14 62 29					0		
	DEGREE DAYS BASE 65 °F	402	323	140	110	0	0	0	0	0					0		
	Cooling	0	0	6	87	469	549	601	562	503					0		
	% OF POSSIBLE SUNSHINE	88	96	97	93	93	81	73	75	82					0		
	AVG. SKY COVER (tenth: Sunnise - Sunset Midnight - Midnigh NUMBER OF DAYS:	3.1 3.1	3.7 3.0	2.8	2.9 2.5	2.2	4.6 4.5	5.7 6.6	5.2 5.7	3.4 3.5					0.0		
	Sunrise to Sunset -Clear -Partly Cloudy -Cloudy	19 7 5	14 9 6	21 6 4	18 9 3	21 8 2	10 13 7	5 19 -7	9 12 10	19 6 5			r		0	·=	
0		Precipi .01 inc	tation hes or	more	3	0	0	4	2	4	21	15	5				
0		Snow, Ic 1.0 inc			0	0	С	0	0	0	0	0	0			1	
0		Thunder	storms		0	0	0	0	, 3	7	25	20	5				
0		Heavy Fo 1/4 mile	g, visi	bility	2	0	0	0	0	0	0	0	1				
		Tempera -Max; 90°	mum														
0		32°	and be	LOW	0	0	0	0	27	29 0	30	27 0	26 0				
0		320	and be	low low	0	5	0	0	0	0	0	0	0			1912	
0.0		AVG. STATIC	N PRES	S. (mb)	928.2	926.9	924.5	923.0	923.5	922.8	924.5	925.2	923.8				
0 0 0	ı	RELATIVE HU Hour 05 Hour 11 Hour 17 Hour 23	Loca	(%) Time)	64 43 34 58	41 24 16 34	34 19 11 24	43 22 16 31	33 16 11 21	36 20 20 30	69 40 36 60	68 43 40 59	53 34 28 46	750			
	i	PRECIPITATI	ON line	ches):													
0.00		Water E -Tota -Grea -Date	al Atest ()		0.62 0.48 5	0.00	0.00	0.36 0.23 6- 7	0.06 0.06 13-14	1.05 0.66 25	2.92 0.53 17-18	4.19 0.81 8- 9	1.81 1.35 25-26				
0.0		-Tota	atest (0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			18	
000 0.0 0.0		-Spe	ection ed Imph e Speed)	138 4.0 8.4	142 1.9 8.4	242 3.2 9.2	230 3.9 9.8	214 2.5 8.8	217 4.7 9.1	181 2.3 8.1	173 2.6 7.5	138 4.4 9.0				
0		-Dir -Spe -Dat	ection ed (mph e		E 28 30	W 33 14	SW 38 26	SW 41 25	SE 43 13	S 34 29	NE 45 16	S 35 22	SE 34 15				
MSG 0			ection d (mph)		SE 38 30	₩ 39 25	SW 51 26		SE 55 13	S 41 29		41	SE 43 15				

(!!) See Reference Notes on Page 68 Page 2

NORMALS, MEANS, AND EXTREMES

TUCSON, ARIZONA

ATITUDE 22 007.11	ONOT	TUDE:	10 0-			ON, AK			. 2555	7.1.45	7045	OUNTATO		ANI 22462
LATITUDE: 32 °07'N	(a)	JAN	FEE	MAR	APR	MAY	grd) 25 JUNE	JULY	AUG	SEP	OCT	NOV	DEC	AN: 23160 YEAR
TEMPERATURE OF:		07111	1 = 1	11/113	711 11	1.173.1	JOIL	JOLI	NOU	JLI	001	1101	DEC	TEM.
Normals -Daily Maximum -Daily Minimum -Monthly		64.1 38.1 51.1	67.4 40.0 53.7	71.8 43.8 57.8	80.1 49.7 64.9	88.8 57.5 73.2	98.5 67.4 83.0	98.5 73.8 86.2	95.9 72.0 84.0	93.5 67.3 80.4	84.1 56.7 70.4	72.2 45.2 58.7	65.0 39.0 52.0	81.7 54.2 67.9
Extremes -Record Highest -Year -Record Lowest -Year	43 43	87 1953 16 1949	92 1957 20 1955	92 1950 20 1965	102 1943 27 1945	107 1958 38 1950	111 1970 47 1955	111 1983 62 1982	109 1944 61 1956	107 1983 44 1965	101 1980 26 1971	90 1947 24 1979	84 1954 16 1974	JUN 1970 DEC 1954
NORMAL DEGREE DAYS: Heating (base 65°F)		431	326	246	86	8	0	0	0	0	30	204	403	1734
Cooling (base 65°F)		0	12	22	86	262	537	657	589	462	198	15	0	2840
% OF POSSIBLE SUNSHINE	36	80	83	86	92	94	93	78	82	87	89	85	80	86
MEAN SKY COVER (tenths) Sunrise - Sunset	42	4.7	4.5	4.5	3.4	2.7	2.2	5.2	4.4	2.9	2.8	3.5	4.4	3.8
MEAN NUMBER OF DAYS: Sunrise to Sunset -Clear -Partly Cloudy -Cloudy	43 43 43	14 7 10	13 7 9	15 7 10	17 7 5	21 6 4	22 6 2	10 12 9	13 12 6	20 7 4	20 6 5	18 6 6	15 6 10	198 89 80
Precipitation .01 inches or more	43	4	4	4	2	1	2	10	9	5	3	3	4	51
Snow, Ice pellets 1.0 inches or more	43	*	*	*	*	0	0	0	0	0	0	*	*	. 0
Thunderstorms	43	*	*	*	1	1	. 2	14	13	6	2	*	*	39
Heavy Fog Visibility 1/4 mile or less	43	*	*	*	0	. 0	0	0	0	0	0	*	. *	0
Temperature ^o F -Maximum 90° and above 32° and below	43 43	0	* 0	* 0	4 0	17	28 0	29 0	29 0	23 0	8	* 0	0	138 0
-Minimum 32° and below 0° and below	43 43	7 0	4	1 0	* 0	0	0	0	0	0	* 0	1 0	5 0	18 0
AVG. STATION PRESS. (mb)	11	927.5	927.1	924.5	924.0	922.5	922.8	924.6	924.8	924.2	925.7	926.9	927.9	925.2
RELATIVE HUMIDITY (%) Hour 05 Hour 11 Hour 17 Hour 23	43 43 43 43		59 35 27 49	54 30 23 43	42 21 16	34 17 13 24	32 17 13 23	57 33 28 47	65 38 33 53	55 32 27 44	52 30 25 43	54 32 28 48	61 39 34 56	52 30 25 43
PRECIPITATION (inches) Water Equivalent -Normal -Maximum Monthly -Year -Minimum Monthly -Year -Maximum in 24 hr -Year	4	3 T 1970	2.90 1980 0.00 1972 1.49	2.26 1952 0.00 1956 1.19	1.66 1951 0.00 1972 0.75	0.89 1943 0.00 1974 0.89	1.46 1954 0.00 1983 1.27	6.17 1981 0.27 1947 3.93	2 2.13 7 7.93 1 1955 7 0.23 7 1976 8 2.46	1964 0.00 1953 3.05	4.98 1983 0.00 1982 3.58	3 0.62 3 1.90 3 1952 0 0.00 2 1980 3 1.86	0.94 5.02 1965 0.00 1981	11.14 7.93 AUG 1955 T JAN 1970 3.93
Snow, Ice pellets -Maximum Monthly -Year -Maximum in 24 hr -Year	5 4	1949	1965	1964	1976	0.0					1959	6.4	1971	DEC 1971 6.80
WIND: Mean Speed (mph) Prevailing Directio through 1963		8 7.8 SE	+	1		-	8.6 SSI			8.2 SE				
Fastest Mile -Direction (!!) -Speed (mph) -yea	3	5 40 1962	59	9 41	46	4:	S	SI SI	NE NE	SE 54	SI SI	E 5	44	SE 71

^(!!!) See Reference Notes on Page 6B. Page 3

YEAR	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV		ANNUAL
1955 1956 1957 #1958 1959	1.89 1.08 2.37 T 0.03	0.19 0.54 0.36 1.15 0.28	0.03 0.00 0.93 1.82	T 0.31 0.16 0.48 0.01	0.03 T 0.33 0.02 0.00	0.03 0.36 0.17 0.51 T	5.10 2.77 1.25 5.20 3.92	7.93 1.12 3.92 0.91 2.79	0.05 0.37 T 0.21	0.32 0.27 2.62 1.21 0.70	T T 0.56 1.09 0.29	0.33 0.22 0.89 0.00 1.97	15.90 7.04 13.56 12.60 9.99
1960 1961 1962 1963 1964	2.01 0.95 1.39 0.59 0.14	0.42 0.01 0.33 0.81 0.13	0.25 0.41 0.25 0.34 0.81	0.00 T T 0.32 0.67	0.08 0.00 0.00 T 0.00	0.25 0.26 0.25 T 0.01	0.73 1.81 1.38 1.66 4.82	2.09 4.28 0.48 2.86 3.90	1.20 0.51 2.86 1.45 5.11	0.71 0.65 0.22 0.60 0.91	0.07 0.44 0.49 1.26 0.68	0.93 1.57 0.93 0.08 0.81	8.74 10.89 8.58 9.97 17.99
1965 1966 1967 1968 1969	0.45 1.74 0.04 0.18 0.74	0.64 2.25 0.13 0.99 0.50	0.27 0.19 0.41 1.79 0.34	0.23 0.12 0.29 0.62 0.60	T 0.11 0.62 T 0.46	0.01 0.02 0.42 0.00 0.00	2.13 2.57 2.72 1.97 1.51	1.12 3.31 2.00 1.12 2.57	0.82 3.53 1.35 T	0.07 0.32 1.03 0.09 0.03	0.77 0.06 0.48 1.86 1.06	5.02 0.19 3.44 0.32 0.82	11.53 14.41 12.93 8.94 9.94
1970 1971 1972 1973 1974	0.04 0.00 0.06 0.93	0.34 0.50 0.00 1.60	1.13 T 0.01 2.20 0.55	0.45 0.56 0.00 0.02	0.03 0.01 0.24 0.09 0.00	0.33 T 0.68 0.50 0.01	2.53 2.18 3.49 1.74 4.44	1.43 3.29 2.93 0.54 1.04	3.58 1.75 1.09 T 1.69	1.73 1.18 4.51 0.00 2.12	0.00 0.69 1.30 0.47 0.81	0.43 1.97 0.61 0.00 0.33	11.98 12.17 14.86 7.22 11.92
1975 1976 1977 1978 1979	0.36 0.06 1.83 2.05 2.94	0.13 0.53 0.04 1.75 0.42	0.95 0.38 0.74 0.89 0.64	0.27 0.57 0.43 0.01 0.04	0.11 0.23 0.08 0.61 0.67	0.00 0.10 0.06 0.22 0.53	2.38 1.18 0.76 0.78 2.04	0.32 0.23 0.80 1.59 2.60	1.26 1.68 1.41 1.66 0.02	T 0.37 2.36 1.86 0.33	0.34 0.48 0.33 1.58 0.01	0.52 0.47 1.33 2.73 0.15	6.64 6.28 10.17 15.73 10.39
1980 1981 1982 1983 1984	0.73 1.29 1.56 1.70 0.62	2.90 0.71 0.06 0.94 0.00	1.22 1.98 1.26 1.28 0.00	0.08 0.56 0.05 0.14 0.36	0.26 0.51 T 0.06	0.23 0.16 0.13 0.00 1.05	1.78 6.17 2.13 1.98 2.92	1.95 0.80 2.51 4.24 4.19	2.93 1.10 2.69 4.28 1.81	0.22 0.06 0.00 4.98	0.00 0.61 1.30 1.71	0.19 0.00 1.59 0.61	12.23 13.70 13.79 21.86
Record Mean	0.84	0.81	0.74	0.35 Se	0.19 ee Refer	0.25 ence No Pag	2.24 otes on e 4A	 2.11 Page 68		0.69	0.77	1.00	11.33

AVERAGE TEMPERATURE (deg. F)

TUCSON, ARIZONA

YEAR	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	ANNUAL
1955	46.7	48.8	59.6	64.4	71.8	82.3	84.6	81.8	81.2	74.3	58.5	55.5	67.4
1956	56.1	48.7	60.2	64.2	75.8	86.2	85.4	84.0	84.3	70.2	57.8	52.5	68.8
1957	53.8	61.1	59.6	66.2	71.2	85.3	88.1	84.2	81.3	67.9	54.3	54.9	69.0
1958	51.4	55.8	54.2	64.5	79.1	84.9	86.9	84.5	80.5	71.9	57.8	55.6	68.9
1959	53.8	51.5	58.2	69.2	72.5	85.4	86.6	81.8	80.2	69.7	58.5	51.4	68.2
1960	46.8	47.8	61.0	65.7	71.9	83.5	86.0	84.2	81.2	67.3	59.2	49.1	67.0
1961	52.5	53.0	58.2	66.2	72.9	84.7	86.1	81.8	77.1	68.5	54.4	50.5	67.1
1962	49.0	54.7	53.3	70.1	71.7	80.3	84.9	87.0	81.3	70.6	61.5	54.0	68.2
1963	48.3	57.5	57.7	64.0	77.3	80.5	87.6	82.3	82.4	73.2	59.3	52.7	68.6
1964	47.5	47.7	54.8	63.2	73.2	82.0	86.2	81.6	76.3	72.1	55.2	52.4	66.0
1965	53.6	51.1	55.1	64.5	70.1	77.6	85.0	84.0	76.8	71.9	62.6	52.1	67.1
1966	47.7	47.8	60.1	66.8	76.1	82.8	85.3	82.9	78.3	68.1	61.1	52.4	67.4
1967	51.4	55.6	62.1	62.1	71.9	80.7	85.4	84.6	80.7	71.6	62.9	48.6	68.1
1968	52.4	59.1	58.7	63.2	73.3	83.5	84.9	81.3	80.7	71.7	58.3	50.6	68.1
1969	55.5	53.1	54.3	66.6	74.9	80.7	86.1	86.3	81.2	66.8	58.6	52.4	68.0
1970	50.0	57.0	55.9	61.1	75.2	83.4	87.2	84.8	76.4	65.1	60.1	51.8	67.3
1971	50.5	52.3	59.8	62.8	69.3	81.2	87.5	81.3	79.1	64.2	56.8	47.1	66.0
1972	50.4	55.8	65.0	65.8	72.3	81.6	86.6	82.9	78.6	66.5	53.0	49.0	67.3
1973	47.6	53.4	51.6	59.7	73.0	81.4	84.3	84.7	79.6	70.7	58.4	52.3	66.4
1974	50.2	51.9	60.1	66.1	74.3	86.9	83.5	83.0	77.8	69.1	57.5	47.0	67.3
1975	49.8	50.7	55.3	57.9	69.8	80.5	84.2	85.8	80.0	69.5	59.3	53.0	66.3
1976	52.6	58.4	58.2	64.8	74.5	83.4	83.9	85.3	77.7	67.8	60.0	52.2	68.3
1977	50.7	56.9	55.7	67.0	70.8	84.7	87.0	86.4	82.0	73.3	61.7	56.9	69.4
1978	53.1	53.6	61.8	65.2	73.1	85.8	88.1	84.7	80.9	73.8	58.5	49.7	69.0
1979	48.4	53.8	56.4	65.6	72.2	83.1	87.5	83.4	84.2	73.0	56.6	55.0	68.3
1980 1981 1982 1983 1984	54.3 54.8 50.7 52.9 51.8	57.9 57.1 54.7 53.8 53.7	57.5 57.1 57.7 57.3 60.5	65.6 69.1 66.1 60.4 64.0	71.5 73.4 72.3 73.8 79.9	84.9 86.1 80.5 81.6	88.6 85.2 84.8 86.9 84.2	84.6 86.4 83.9 84.0 82.9	80.5 80.7 79.2 82.2 81.5	69.6 68.1 67.0 69.5	59.5 62.2 57.7 57.4	58.1 55.0 50.1 53.5	69.4 69.6 67.0 67.8
Record Mean Max Min	50.4 64.3 36.4	53.3 67.6 39.0	57.7 72.7 42.7	64.4 80.6 48.3 Se	72.6 89.3 55.8 ee Refer		86.0 99.1 72.9 otes on e 4B	84.0 96.6 71.3 Page 68	80.0 94.0 66.0	69.5 84.8 54.1	58.2 73.1 43.3	51.4 65.3 37.5	67.4 82.2 52.7

SEASON	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	TOTAL
1955-56 1956-57 1957-58 #1958-59 1959-60	00000	00000	00000	0 47 41 27 45	198 223 314 215 189	288 378 306 284 416	268 340 416 340 556	468 128 252 370 493	167 167 329 205 136	84 50 100 8 68	0 18 0 10 5	00000	1473 1351 1758 1459 1908
1960-61 1961-62 1962-63 1963-64 1964-65	0 0 0 0	0000	00000	37 61 13 2 5	183 312 137 186 293	486 444 336 372 383	381 491 515 533 348	331 285 215 497 383	206 357 234 321 305	41 5 79 107 114	9 7 0 27 21	00000	1674 1962 1529 2045 1852
1965-66 1966-67 1967-68 1968-69 1969-70	0000	0000	80000	33 20 14 4 55	110 126 89 204 188	396 386 502 440 384	532 416 384 288 455	473 256 170 328 224	166 115 200 339 274	26 113 91 34 132	0 20 0 35 8	00000	1744 1452 1450 1672 1720
1970-71 1971-72 1972-73 1973-74 1974-75	00000	00000	0000	58 120 96 23 53	143 249 358 216 218	403 548 489 390 552	445 444 533 451 465	350 259 320 362 393	200 73 410 161 299	111 50 174 49 217	12 0 19 5 29	00000	1722 1743 2399 1657 2226
1975-76 1976-77 1977-78 1978-79 1979-80	00000	00000	00000	38 45 1 15 26	191 178 117 213 252	365 390 242 470 302	378 435 365 511 323	180 221 313 311 202	221 287 144 260 227	88 65 64 76 84	5 9 24 20 3	00000	1466 1630 1270 1876 1419
1980-81 1981-82 1982-83 1983-84 1984-85	00000	0000	00000	66 34 41 0	197 106 211 232	210 304 456 348	310 437 371 402	220 291 309 323	244 223 239 140	31 46 168 110	10 6 0	0 0 0	1278 1451 1801 1555

See Reference Notes on Page 6B. Page 5A

COOLING DEGREE DAYS Base 65 deg. F

TUCSON, ARIZONA

YEAR	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	TOTAL
				**	9 7	3-7							90
		,		16.								11	
			100										
				100									
1969	0	0	15	87	348	477	658	669	493	118	1	0	2866
1970 1971 1972 1973 1974	0.6000	5 0 1 0 0	0 45 82 0 18	25 51 82 21 87	333 152 236 272 301	561 493 506 495 664	693 706 678 603 581	620 514 563 615 564	347 430 414 445 387	68 101 150 206 185	1 1 26	00000	2656 2510 2713 2685 2788
1975 1976 1977 1978 1979	02000	00000	4 14 5 54 1	11 89 133 76 101	184 306 198 283 249	471 557 597 630 551	604 597 691 721 706	651 636 669 616 576	458 386 517 483 580	182 139 266 293 282	27 34 23 28 6	00000	2592 2760 3099 3184 3052
1980 1981 1982 1983 1984	0000	4 8 4 0 0	1 4 4 8 6	109 159 82 36 87	211 267 244 288 469	606 639 471 503 549	742 633 622 688 601	615 670 594 600 562	474 476 437 523 503	216 137 112 145	37 27 0 10	3200	3018 3022 2570 2801

See Reference Notes on Page 6B. Page 5B

SEASON	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	TOTAL
1955-56 1956-57 1957-58 1958-59 1959-60	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 T	0.0 0.0 0.0 6.4 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 1.3	1.0 0.0 0.0 0.0 T	0.0 0.0 T 0.0	1.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	2.0 0.0 T 6.4 1.3
1960-61 1961-62 1962-63 1963-64 1964-65	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 T 0.0 0.0 3.9	0.0 0.0 0.0 5.7 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 T 0.0 5.7 4.0
1965-66 1966-67 1967-68 1968-69 1969-70	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.3 T 1.6 0.4 T	0.0 0.0 0.0 0.0	1.2 0.0 0.0 0.0 0.0	0.0 0.0 0.0 T	0.0 T 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	1.5 T 1.6 0.4
1970-71 1971-72 1972-73 1973-74 1974-75	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 6.8 0.0 0.0	0.0 T 0.4 0.0	0.0 0.0 0.0 T	0.0 0.0 0.0 T 0.5	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.4 0.5
1975-76 1976-77 1977-78 1978-79 1979-80	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 T	0.0 0.0 0.0 1.2 0.0	0.0 0.0 0.0 0.0	3.8 0.0 0.0 0.0	2.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	5.8 0.0 0.0 1.2
1980-81 1981-82 1982-83 1983-84 1984-85	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 T 0.0	0.0 T 0.0 0.0	0.0 0.0 0.0 0.0	T T 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	T T 0.0
Record Mean	0.0	0.0	0.0	T See	0.2 Refere	0.3 ence Not Page				0.1	0.0	0.0	1.2

REFERENCE NOTES

TUCSON, ARIZONA

GENERAL
T - TRACE AMOUNT
BLANK ENTRIES DENOTE MISSING/UNREPORTED DATA
INDICATES A STATION OR INSTRUMENT RELOCATION
SEE STATION LOCATION TABLE ON PAGE 8

PAGE 2
PM - LAST DAY OF PREVIOUS MONTH

PAGE 3
(a) - YEARS OF RECORD, THROUGH THE CURRENT YEAR
UNLESS OTHERWISE NOTED, BASED ON JANUARY
DATA
* LESS THAN ONE HALF
NORMALS - BASED ON THE 1951-1980 RECORD PERIOD
MEANS - LENGTH OF RECORD IN (a) IS FOR COMPLETE
DATA YEARS, EXCEPT AS NOTED
EXTREMES - LENGTH OF RECORD IN (a) MAY BE FOR OTHER
THAN COMPLETE OR CONSECUTIVE DATA YEARS
EXTREME DATES ARE MOST RECENT OCCURENCE
WIND DIR. - NUMERALS SHOW TENS OF DEGRESS CLOCKWISE
FROM TRUE NORTH. "OO" INDICATES CALM
RESULTANT DIRECTIONS ARE GIVEN TO WHOLE DEGREES

TUCSON, ARIZONA NATIONAL WEATHER SERVICE OFFICE

Within 10 to 15 miles of the station the terrain is flat or gently rolling, with many dry washes. There is a general increase in elevation from north and northwest to south and southeast. Rugged mountain ranges and jutting hills encircle the valley floor. The higher mountains to the north, east, and south reach up to over 5,000 feet above the airport, and are at distances of 25 to 40 miles. To the west, the hills and smaller mountains range from 500 to 4,000 feet above the airport; all are more than 5 miles distant.

The soil cover is rather sandy, and native vegetation is mostly brush, cacti, and small trees, typical of the low latitude desert climate. The metropolitan area of Tucson lies at the foot of the Catalina Mountains, to the north of the airport. As a result of the lower elevation and more protected location of the City, recorded maximum temperatures are usually higher there than at the airport and minimum temperatures are correspondingly lower than at the airport.

As might be expected from its geographical situation, the climate of Tucson is prominently characterized by a long, hot season, beginning in April and ending in October. Maximum temperatures above 90 degrees are the rule from May through September. Occurrences of temperatures of 100 degrees or higher averaged 41 days annually for the 25-year period 1951-75, but these extreme temperatures are not as uncomfortable as they might seem since they are associated with low relative humidity. June and July averaged 14 days each with 100 degrees or higher readings. Under usual conditions, the diurnal temperature range is large, averaging almost 30 degrees, although it may exceed 40 degrees. Clear skies or very thin high clouds permit intense surface heating during the day and active radiational cooling at night, a process-enhanced by the characteristic atmospheric dryness. The average growing season in the Tucson area approximates 250 days.

The distribution of precipitation through the year is such that more than 50 percent of the annual amount usually falls between July 1 and September 15, and a secondary maximum from December through March provides over 20 percent of the yearly precipitation. During the July-September period scattered convective or orographic showers and thunderstorms occur that often fill dry washes to overflowing. On occasion, brief, torrential downpours cause spectacular and destructive flash floods in sections of the metropolitan area, sometimes from short-period falls of over 1.50 inches. Hail rarely falls in thunderstorms, and

sleet is an almost unknown form of precipitation. The December through March precipitation is more general and occurs as prolonged rainstorms that provide much needed replenishment of ground water. During these storms, snow often falls on the higher mountains, but snow in Tucson itself is infrequent particularly in accumulations exceeding an inch in depth.

Relative humidity shows a pronounced daily oscillation in line with the usual large daily range in temperature. From near the first of the year, the average relative humidity decreases steadily until July and the beginning of the thunderstorm season, when it shows a marked increase. By the middle of September, and end of the thunderstorm season, it decreases again, resuming the upward climb in late November. Only occasionally during the summer is relative humidity high enough to produce appreciable physical discomfort, and then only for short periods. During the hot season, relative humidity values may fall below 10 percent during afternoons, and sometimes below 5 percent. The low average wet bulb temperature during hot weather makes evaporative air coolers effective most of the time.

Tucson lies in the zone receiving more sunshine than any other section of the United States; the persistence of the bright sunshine is one of the most noteworthy features of this desert climate. Cloudless days are commonplace, and average cloudiness, much of it being very thin cirriform clouds, is low.

Surface winds are generally light, with no important seasonal changes in either velocities or prevailing direction. Occasional windstorms cause localized duststorms, particularly in the outlying sections of rucson where the ground has been disturbed in numerous development areas. During the spring months, winds may briefly be strong enough to cause some damage to trees and buildings. Wind velocities and directions are influenced to an important extent by the surrounding mountains, as well as by the general slope of the terrain. With weak pressure gradients, local winds tend to be in the SE quadrant during the night and early morning hours, veering to NW during the day. Highest velocities usually occur with winds from the SW and E to S.

While dust and haze of local origin are frequently visible, their effect on the general clarity of the atmosphere is not great. Visibility values are normally high; and fog is extremely rare.

									Elevati					561		• Type
						Sea				G	round		,		Qd,	M = AMOS T = AUTOB
Location	Occupied from	Occupied to	Airline distance and direction from previous location	Latitude North	Longitude West	Ground at tem-	Wind instruments	Extreme thermometers	Psychrometer	Sunshine Switch	Tipping bucket	Weighing rain gage	8" rain gage	Hygrothermometer	Automatic Observin	Remarks
COOPERA TI VE				19												
University of Arizona	10/1891	Present	NA	32° 14'	110° 57'	2391	45 a40	11 a5	11 a5				3			a - Effective 9/1894.
AIRPORT																
Nucson Municipal (Later Davis-Monthan Air Force Base)	1/22/30	10/14/48	NA	32° 11'	110° 55'	2553	ъ33	Unk c5	Unk c5		el4	b3 d14	Unk c5 d14			Army Signal Service to Nov. 1932 b - Added 6/17/40. c - Effective 6/17/40. d - Moved to roof 7/23/47. e - Added 10/1/47.
Nucson Municipal	10/14/48	10/15/58	4.9 mi.SW	32° 08'	110° 57'	2558	33	5	5	Unk	5		5	7.4		New Airport
Tower & Operations Bldg. Tucson Municipal AP †	10/15/58	6/4/80	4500 ft. E	32° 07'	110° 56'	2584	20	5	5	109	3	NA	4	7.5	NA	
Tucson International AP effective 3/13/63				(a. 6)												% - Telepsychrometer.
Nat. Weather Svc Bldg. Iucson International AP	6/4/80	Present	600' NE	32° 07'	110° 56'	2580	f20	5	5	15	3	NA	4	%5	МА	f - Not moved 6/4/80.

SUBSCRIPTION:
Price and ordering information available through: National Climatic Data Center, Federal Building, Asheville, North Carolina 28801, ATTN: Publications.

I certify that this is an official publication of the National Oceanic and Atmospheric Administration, and is compiled from records received at the National Climatic Data Center, Asheville, North Carolina 28801.

Acting Director
National Climatic Data Center

USCOMM-NOAA-ASHEVILLE - 1300

DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL ENVIRONMENTAL SATELLITE, DATA. AND INFORMATION SERVICE
NATIONAL CLIMATIC DATA CENTER
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ASHEVILLE, N.C. 28801

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The State Climatology Program for Nebraska

The University of Nebraska's Center for Agricultural Meteorology and Climatology (CAMaC) was formed in the late 1970s when existing meteorology and climatology units were consolidated into one research, teaching and service unit. Dr. Norman J. Rosenberg is director of the Center which is located in the recently remodeled L. W. Chase Hall on the East Campus of the University of Nebraska, Lincoln. CAMaC's mission in research, extension and teaching is carried on by six faculty members. In addition, there are five courtesy appointments to the CAMaC faculty.

Users of climate data in Nebraska are served by staff members of the Center for Agricultural Meteorology and Climatology. Data collection and dissemination are supervised by Dr. Kenneth G. Hubbard, the Climate Resources Specialist.

Activities of the Climate Resources Specialist include:

- a) coordinating the University's basic-data collection, storage and retrieval program with the National Climatic Data Center and the Nebraska Natural Resources Data Bank;
- preparing and interpreting the data necessary for pamphlets, reports and press releases;
- c) developing and managing the new data collection system involving automatic weather stations within the state and other real-time data sources; application of this data and existing climatological information to specific operational activities and extension education

programs such as irrigation scheduling, integrated pest management; and

d) participating with researchers from other disciplines in climatological research efforts related to food, energy and planning for preparedness against natural hazards.

Climate Resources Library

An up-to-date library of climate data and publications is maintained as a resource area to help in answering the many requests for descriptive or quantitative weather information. Copies of original weather records and published weather data are kept for Nebraska and surrounding states. In addition, climatological and meteorological reference books and extension reports are available to users of the Climate Resources Library. Computer data retrieval is also used to fill user requests. Mr. Mathew Werner (Fig. 1) is the primary contact for users of the Climate Resources Library.

Much of the information received at the library is in the form of microfiche. This microfiche is used in a reader/printer located in the library to produce images or paper copies as needed for users.

A publication based on incoming weather records is published at the end of each month to provide Nebraskans with a preliminary assessment of recent weather conditions in the state. The preliminary report focuses on temperature and precipitation but also includes solar radiation, wind and humidity information when appropriate. The report is circulated to a regular mailing list of about 150 including newspapers and wire services.

CAMaC has developed a weather data network, the first of its kind, to supply timely weather information to decision makers in agriculture. In 1980 the Center, with funding from NOAA's National Climate Program Office, undertook development of a weather network that would support irrigation and other agricultural operations. By the spring of 1981, the network was operating. This network automatically collects hourly weather data from monitoring stations across the state. After collection, the data are archived and summarized for dissemination by the University's Automated Weather Data Network—AWDN, for short.

Four of the five initial weather monitoring stations were located in southwestern Nebraska, an area where irrigation using ground-water from the Ogallala aquifer had been widely adopted by farmers. The stations were spaced 70 miles apart in a nearly uniform grid. Today, there are 23 stations in Nebraska, six in South Dakota, one in Colorado and one in Kansas that feed weather data to Nebraska's CAMaC network.

A complete station has several weather measuring instruments attached to a 10-foot tower (see Fig. 2). The instruments measure wind speed and direction, air temperature and relative humidity, solar radiation, soil temperature and precipitation. Each station also has a microprocessor that records dataserving as an on-site data observer. After monitoring signals from the instruments each minute, this microprocessor calculates hourly averages or totals that are stored in the microprocessor's memory bank.

3 a.m. daily to gather the information (see Fig. 3). With this technology the university quickly completes data collection and eliminates the need to manually record and process the information.

When the information is collected from these stations, it is then uploaded to a "main frame" computer that houses the user-friendly AGNET system. Many Nebraska farmers tap AGNET for a variety of information and applications, such as marketing and finance, crop and livestock production, and grain handling. Weather-related programs, such as irrigation scheduling and crop development, are now available to farmers through the university's AGNET system.

Data collected from these automated stations is also used by the University's extension Agricultural Climate Situation Committee to provide farmers with viable management options. The AGNET system and the agricultural climate situation committee are two unique means of analyzing and distributing pertinent weather information (see Fig. 3), and both provide a key service that farmers can't get elsewhere.

AGNET'S ROLE

Weather data collected by the automated weather stations is used in AGNET computer programs for scheduling irrigation, estimating crop development rates, estimating energy requirements for grain drying, and predicting livestock weight gains. Other possible AGNET weather-related programs include scheduling fertilizer applications, the time of pesticide applications, and analyzing weather's stress on crops and livestock.

The AGNET computer program that estimates crop development rates is CROP STATUS. Initially developed by Ralph Neild, a UNL climatologist and the Agri-

cultural Climate Situation Committee founder, the program allows farmers to estimate frost probability and harvest dates based on growing degree days and planting scenarios.

The grain drying AGNET program, called BINDRY, uses temperature and relative humidity data. Farmers can use up-to-date weather data to estimate the future moisture and temperatures in the bin and to determine the airflow needed for that day. BINDRY provides drying information for each layer. If a farmer fills a grain bin to 25% of its capacity, the program tells him how much the grain has dried and when he can load more grain into the bin.

In the livestock management area, one of the programs offered by AGNET is called BEEF. This program estimates the energy balance of feedlot animals and projects the amount of feed needed for body maintenance and weight gain. The program is based on feed ratios, economic factors, and weather data, such as temperature, relative humidity, and wind.

Although AGNET programs range from listing the hourly and daily weather factors in a specific region to estimating crop development, frost probability or harvest dates based on growing degree days and climatic conditions, the most popular weather-related programs among AGNET users are the ones on irrigation.

Thomas Thompson, an AGNET supervisor and UNL agricultural engineer, developed a data management system to handle AWDN data on AGNET and was one of the scientists who helped develop an irrigation scheduling program on the AGNET system. The IRRIGATE program, based on soil information, irrigation system size and speed, and weather data, projects a time period in which irrigation should be scheduled to avoid either overwatering or crop stress.

CLIMATE COMMITTEE

The second method of delivering weather information to Nebraska farmers involves the University's Agriculture Climate Situation Committee.

The committee, formed in 1981, is part of the agricultural cooperative extension service and reviews weather information from the AWDN every Monday afternoon during the growing season. After examining weather information and discussing what it means to the state's farmers, the committee issues advisories that are distributed (see Fig. 4) by 55 state newspapers, 20 radio stations, and an extension television program called Farm and Ranch Review.

The committee members include meteorologists, climatologists, agronomists, soil scientists, plant pathologists, entomologists, a rangeland specialist, a forester, an animal scientist, a veterinarian, and a journalist who is responsible for condensing the committee's advisory information and releasing it to the state's newspapers and radio stations.

When the committee meets, the climatologists summarize the recent weather features and the crops' estimated stage of growth based on weather information. All specialists on the committee then offer observations that they have made and outline problems that have been identified during the past week. The committee also taps into other information sources, such as the Weekly Weather and Crop Bulletin, and the Monthly and Seasonal Weather Outlooks produced by NOAA and USDA. The Nebraska State Climatology Program coordinates the reference materials used by the committee.

Before this committee and the Automated Weather Data Network were created in Nebraska, there was no forewarning or forecasting of what kind of damage might result when a serious weather problem developed. Specialists were

pressed for information before adequate data could be collected and analyzed. Today, specialists are working with near-real time data provided by the automated weather network, and the committee can make an immediate and unitied appraisal.

Summary

The State Climatology Program in Nebraska employs traditional functions of archiving and disseminating weather data as well as new technologies for near-real time data collection, summarization and distribution. This has allowed CAMaC to develop a wider user audience. For example, accesses by users of the weather related programs on AGNET exceeded 15,000 in 1984. In Nebraska, the Agricultural Climate Situation Committee, AWDN and AGNET are part of the effort to better serve users of climate information.

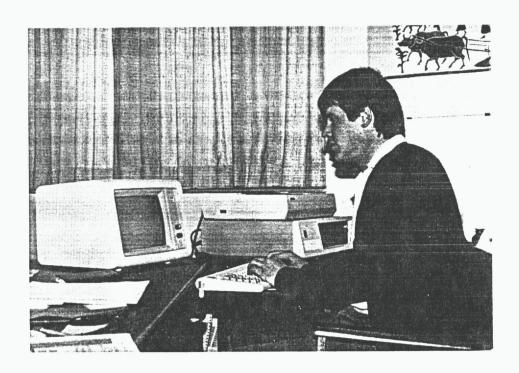
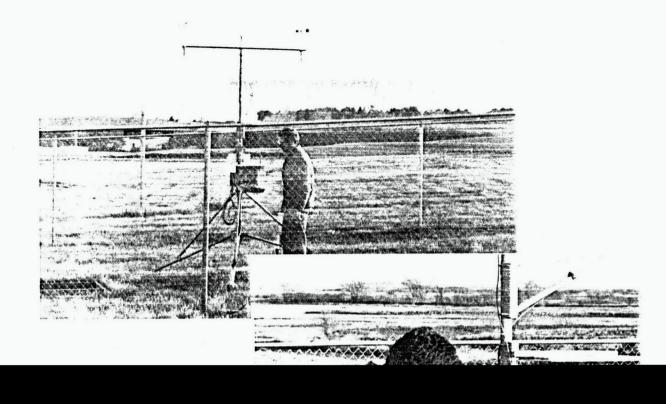


Fig. 1. Mathew Werner is responsible for weather data requests.

Traditional hard copy weather data archives have been augmented at Nebraska in recent years by computer accessible data sets.



Nebraska Weather and Climate Information Services

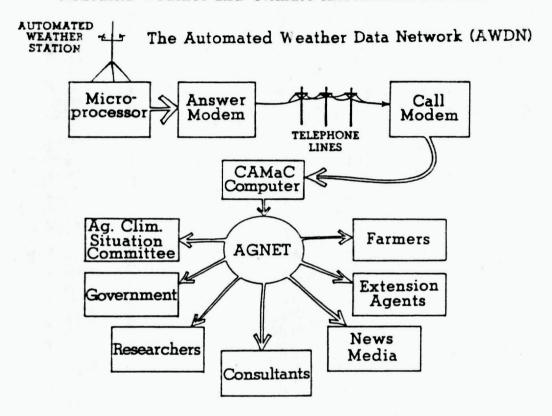


Fig. 3. Once weather information is collected by the automated stations located across Nebraska, it is sent to a CAMaC computer and then transmitted to the AGNET computer information service and the University Extension Agricultural Climate Situation Committee. AGNET and the situation committee are separate methods of distributing weather information to farmers, news media, extension agents, agricultural consultants, researchers, and both state and federal government agencies.



Fig. 4. Ken Hubbard (left), University of Nebraska climate resource specialist and one of two climatologists on the University's Agriculture Climate Situation Committee, is issuing a weather advisory for farmers. The message, taped by a committee member, is accessed by approximately 20 Nebraska radio stations every Monday during the growing season. AGNET and Nebraska's daily and weekly newspapers also receive the weather advisories. Craig Derscheid, a University of Nebraska agriculture communications specialist, is behind the control panel.