STRATIFIED MAXIMUM TEMPERATURE RELATIONSHIPS BETWEEN SIXTEEN ZONE STATIONS IN ARIZONA AND RESPECTIVE KEY STATIONS

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ABSTRACT

The validity and applications of this hypothesis are examined: normal monthly deviation relationships of Arizona maximum temperatures, between a given zone station and its MOS key station, are largely unrepresentative during anomalous weather regimes. A much stronger relationship is found: Temperature--and seasonally-dependent mean difference between zone station and respective key station maximum temperatures. A forecast technique using AFOS is outlined. Application to snowfall prediction is discussed.

1. BACKGROUND INFORMATION

This study involved an extensive tabulation of temperature relationships between each of sixteen zone stations in Arizona and respective key stations. Key stations were defined as the five cities in Arizona for which Model Output Statistics(MOS) temperature forecasts are generated, plus the city of Prescott. Each of these cities was considered to be meteorologically representative of the climatic zone in which it is located (2) (Figure 1). For example, Prescott would be the key station for the central basin and northwest zone of Arizona (average elevations of the zone stations 3000 to 6000 feet). Similarly, Flagstaff would be the key station for the central mountain zone (elevations above 6000 feet).

This research used a temperature-and season-dependent stratification to expand upon the basic principle of using normal monthly maximum and minimum temperature deviations between various zone stations and the appropriate key stations. Normal monthly maximum and minimum temperatures at all twenty-two of the stations for which temperature forecasts are prepared in Arizona are readily available at the National Weather Service Forecast Office in Phoenix, Arizona (WSFO PHX) (3). Thus, the average monthly differences between each of the sixteen zone stations and the respective key station have been computed for both maximums and minimums. The differences, or deviations, are used as guidance in the preparation of the Arizona community and recreational area forecasts of maximum and minimum temperatures for the zone stations.

However, the use of normals which have been derived for an entire month at a given station was theorized to have inherent weaknesses. Normals are tabulated over a long period of record. In Arizona , extreme temperatures at a given station during a given month can be common. For example, during the cool season, the southern latitude of Arizona can typically allow strongly and rapidly rebounding temperatures following an unusually cold outbreak. Similarly, very cold outbreaks can typically end a period of unusually warm readings. During the summer thunderstorm season of July and August (informally referred to as the Arizona monsoon), clouds and thunderstorms can cause wide day-to-day variation in temperatures. In general, varying degrees of winds, clouds, humidity, precipitation, and snow cover can induce considerable day-to-day variation in either the maximum or minimum temperature at a given station within the state, or even within a given area of the state.

The observed maximum or minimum temperature is directly a function of the overall character of the concurrent synoptic regime. For example, a high temperature of only 55°F at Tucson in the middle of September can generate rather strong inferences about the existing synoptic weather regime. During a "normal" synoptic regime for the same time of year, the average maximum temperature at Douglas is five degrees cooler than Tucson. When Tucson has an anomalously low maximum temperature of 55°F in the middle of September, Douglas might average two degrees warmer, as opposed to the "normal" five degrees cooler than Tucson.

It is not so important to know the exact cause of the unusually low maximum at the key station in this example. The important point is that the majority of cases with similar low maximums which have occurred in September at Tucson in the past were likely caused by similar or related synoptic regimes. And in the majority of those similar regimes, Douglas will typically average two degrees warmer than Tucson.

Therefore, this study set out to investigate the above idea by deriving a set of relationships between observed key and zone station temperatures that are temperature and seasonally dependent. It was hoped that the outcome of this stratification would ultimately provide a more representative means for relating the forecasted temperatures at key stations to those of the zone stations during anomalous weather regimes.

2. DATA TABULATION

The period selected as the data base was from July 1971 through August 1981. Six key stations were selected (Table 1). These stations included the five normally transmitted as the coded cities forecasts by the Automation of Field Operations and Services (AFOS) system (under the heading PHXCCFPHX). The key stations chosen were Phoenix (PHX), Tucson(TUS), Flagstaff (FLG), Winslow (INW), Yuma (YUM), and Prescott (PRC). Also shown in Table 1 are the sixteen zone stations for which routine temperature and precipitation probability forecasts are prepared by Phoenix WSFO (under the AFOS heading PHXRECPHX).

Five synoptically similar periods were selected for the purpose of data stratification. The periods were November through February, March through April, May through June, July through August, and September through October.

Table 2 is a sample of the tabulation form used to record the maximum temperature data during the period of study. The key station Winslow is used as an example for the period March through April. The observed maximum temperatures at Winslow for each day of every March and April during the period of study were stratified according to the appropriate five-degree temperature range. As each daily maximum was identified with the proper temperature range, the corresponding maximum temperatures at each of the two Winslow zone stations for that same day were recorded within the appropriate data entry square.

The sixteen zone stations used were all stations with a long and established observational history. The quality of the maximum/minimum observations was regarded in general as high. However, it should be noted that during the course of this data tabulation, it became possible that "reset" maximum temperatures might partially contaminate the data sample. These resets occasionally occur at the stations which read and reset the maximum thermometers only once daily at 4 p.m. MST. Should the next day be cooler, the official high temperature for that day could be reported as the 4 p.m. temperature from the previous day. In some of these cases, subjective adjustments to these resets could be made by noting a consistent amount of 24-hour maximum temperature drop at several surrounding stations that do reset their thermometers twice a day. The amount of data identified as reset temperatures ended up being much less than one percent of the total data sample within each key station data base. Despite the apparent negligible effects "resets" would have on the data tabulation, in all but the most obvious cases, adjustments were not made, and the temperature was excluded.

Returning to the Winslow example, temperature data at each zone stations for each March and April during the entire period were recorded. Tabulations were then made of the mean of these temperatures, the standard deviation, and the number of entries for each zone station within each five-degree Winslow temperature range. Finally, the difference or deviation of each mean temperature from the midpoint of each temperature range for Winslow was determined for each individual zone station.

The above process, using the appropriate maximum temperature data, was repeated for the other key stations of Tucson, Flagstaff, and Prescott. The key station Yuma did not have any related zone stations. The key station Phoenix only had one affiliated zone station, at Coolidge. Since maximum temperatures at Coolidge are consistently very similar to those of Phoenix, the stratification process seemed to provide little additional advantage over that of simply using the normal monthly deviation. Therefore, it was decided to continue to use the normal monthly deviation of the Coolidge maximum from Phoenix.

A similar stratification process was also attempted for minimum temperature data during the period of study for all key stations. However, this procedure was discarded near the midpoint of the data tabulation. The less conservative nature of minimum temperatures rapidly became apparent due to the wide variation of minimum temperatures being recorded for each zone station within each appropriate key station temperature range. Therefore, the use of average monthly deviation of minimum temperatures at each zone station from the corresponding key station was preferred over the results of a separate stratification process.

3. DATA ANALYSIS AND RESULTS

This discussion will be confined to the results of the process of maximum temperatures stratification only. Tables 3 through 6 display the tabulated results of the data collection for the key stations Tucson, Prescott, Flagstaff, and Winslow.

For each five-degree temperature range, the mean temperature (X), the deviation (DEV) of that mean temperature from the midpoint of the temperature range, the standard deviation (S), and the number of cases (N) used to compile the above values, are listed by key station and seasonal period.

Standard deviations (S) were examined in depth at the completion of the data tabulation. While it is true that correlation can be independent of S, it was felt that an analysis of S should still provide insight as to whether the desired relationships exist. Table 7 is the summarized analysis of S yielded by the study. In Table 7, the S values for each key station temperature range from Tables 3 through 6 were combined and averaged within each seasonal period by zone station. Only those S values that were derived from a data sample (N) greater than or equal to 10 for that particular key station temperature range were included in the averaging process. The results of the averaging were grouped by range of S for each zone station in the first portion of Table 7. Following this, individual S values for zone stations were averaged to determine a zone average for each key station within each seasonal period. These results are listed by ranges in the second part of Table 7.

No threshold value of S has been determined which can be used to specify or define the strength of the relationship between the maximum temperature of the key station and the corresponding maximum temperature at the respective zone stations. Yet, the fact that the majority of these station averages of S were 3.50 degrees or less, would appear to be some support that these relationships are sufficiently sound. In fact, these zone station standard deviation averages were actually overwhelmingly in the 2.50 to 3.00 degree grouping for the Tucson and Prescott zones. Note as well that for each key station, it should perhaps have been expected that the largest values of these zone stations averages of S would occur during the rather changeable November through February seasonal period. Despite not having any defined threshold value of S, the averages within this period still appear to be quite acceptable, being near or below 4.00 degrees. Again, while it is accepted that correlation can be independent of S, the values of S yielded by this analysis do reflect an internal consistency supportive of a favorable correlation between key and zone station.

The individual zone station averages of standard deviation in Table 7 also suggest which stations might consistently have the strongest or weakest relationships with their key station. The zone stations Bisbee (BIB), Globe (GLB), McNary (MNY), and Page (PGA) appear to consistently exhibit the weakest relationships, while Nogales (NOG) and Payson (0E4) have relatively strong relationships. The stations Safford (E74), Kingman (IGM), Show Low (E03) and Canyon de Chelly (CNC) also seem to trend towards an overall weak relationship to the key station, while Sierra Vista (FHU), Douglas (DUG), Grand Canyon (GCN), Cottonwood (COT), and Sedona (SED) lean in the direction of a somewhat stronger relationship.

A considerable amount of discussion could be generated as to the reason for a given degree of relationship between a zone station and the corresponding key station. These relationships could be controlled by a number of factors ranging perhaps from the distance between key and zone sation, to differences in elevation, to station exposure and local effects. The important point is that the results of the standard deviation analysis help show that, overall, the hypothesized relationships betwen the key stations and their respective zone stations appear to be valid and sound.

Standard deviations were also examined from the standpoint of attempting to show that each station within a zone could also be related not just to the key station for that zone, but to each other as well. Therefore, the values of S for each zone station were plotted on graphs for that zone to compare differences in S between the seasonal periods. This time, the S values for each zone station were averaged for all key station temperature ranges, regardless of the sample size (N). Figure 2 displays graphs for each of the four key stations Tucson, Prescott, Flagstaff, and Winslow, depicting the variations of S between seasonal periods for each zone station related to that key station. With very little exception, these graphs show similar variations within the zone, strongly suggesting a sound interrelationship.

The results of this study also show varying distributions of the deviations (DEV) of the mean temperature (X) at a given zone station from the midpoint of the appropriate key station temperature range. The primary hypothesis which provided the foundation for this study was that the monthly temperature deviations at a given zone station were not representative during anomalous weather patterns. Tables 3 through 6 help validate this hypothesis. For nearly all zone stations, a substantial variance of DEV occurs between the various key station temperature ranges.

Three separate patterns were observed relating to the manner in which the values of DEV changed at the zone stations within each seasonal period. The patterns are summarized in Table 8. Whenever a particular pattern was identified at the majority of the zone stations affiliated with a given key station, that key station was entered in Table 8 for that pattern under the appropriate seasonal period.

The most common pattern observed is that the DEV becomes increasingly less positive (or more negative) from the coldest anomalies for a given seasonal period toward the warmest anomalies. Of those key stations which fall within this category, about half exhibit a change in sign of the value of DEV from positive to negative, although it is possible that this can easily be attributed to chance.

The second pattern, which surfaced rather infrequently, is a small change in DEV of 3 degrees or less from the coldest to the warmest anomalies. Occurrences of this pattern favor the transition months of March/April and September/October.

The final pattern, which only occurs once, is where the values of DEV become increasingly negative toward each of the coldest and warmest anomalies. The single occurrence is noted for the Tucson zone stations during the November/February seasonal period. Applying the trends of the most common pattern, where DEV becomes less positive (or more negative) from the coldest to the warmest anomoly to the Nov/Feb Tucson zone data in Table 3, one would have expected different zone station values of DEV for the 36 to 40 degree F range, as well as the 41 to 45 degree F interval. These should have ranged from about plus two at Nogales to minues one at Safford and Douglas, to minus three at Fort Huachuca, and minus four at Bisbee. These projected values would have been quite reasonable when considering the effects of winter temperature inversions in the Tucson valley. Temperature inversions will typically limit the difference between the maximum temperature at Tucson and the maximums at other Tucson zone stations which are at higher elevations and generally above the inversion level. Yet, at the colder anomalies, the gap between the Tucson maximum and the maximums at the Tucson zone stations begins to widen.

A possible explanation could rest with "backdoor coldfronts" and other incidences of low-level easterly flow generated by a buildup of surface pressure over the southern Rockies and southern Plains. During these occurrences, colder air in the lower levels pushes into southeast Arizona, typically generating a cold anomalous situation. However, the topography of southeast Arizona is such that this air can be modified due to downslope effects, by the time it reaches the Tucson valley. This downslope flow tends to negate the extreme effects of the cold air by the time it reaches Tucson, while the remainder of the Tucson zone stations undergo rather strong low-level cold advection. This could possibly account for the uniqueness of this particular DEV pattern.

Finally, it should be mentioned that despite the fact that this study incorporates ten years of data, there still is really no conclusive evidence that these three patterns did not arise from random occurrences. Only the future accumulation of new data into the data base will provide this needed evidence.

4. APPLICATIONS

The results of this study are routinely applied within the development of the community and recreational forecast package consisting of temperatures and probabilities of precipitation for sixteen zone stations in Arizona (AFOS heading PHXRECPHX). The appropriate AFOS applications program is initiated by entering the run line command, "RUN:RECS AAA BBB CCC D E F". The first, second, and third period temperature forecasts for Prescott are entered for AAA,BBB, and CCC respectively. The single digit precipation probabilities are also entered for D, E, and F. This probability portion of the run line will also accept a "-" or a "+" as well in lieu of five percent and one hundred percent, respectively. The program then reads the coded cities forecast product (PHXCCFPHX) to obtain the temperature and probability of precipitation forecasts for the remainder of the key stations.

The seasonal period and the hour of the forecast being prepared (early morning or afternoon) are determined within the program using the computer clock. Therefore, given these parameters as well as the forecasted temperatures at each key station from the PHXCCFPHX product and the Prescott information from the run line, a series of searches and calculations commences. For the periods which involve only maximum temperature forecasts, the appropriate DEV resulting from the stratification process is applied toward the calculation of the max temperature forecast at each of the sixteen zone stations. The value of DEV is the only portion of the study results used in obtaining the final forecasted maximum temperature output. For minimum temperatures, calcuations of the forecasted minimum temperatures are performed using just the normal monthly deviations from zone station to key station. Probabilities of measurable precipitation previously designated to each key station are simply reassigned to the respective zone stations.

The results of the study are only utilized in the computation of the maximum temperatures. The forecasted minimum temperatures and probabilities of precipitation forecasts are therefore independent of the study. Yet, the final output was formatted to include minimum temperature calculations and precipitation probability assignments in order that the output duplicate the actual format of the community and recreational area forecast package (PHXRECPHX) for ease of transmission. Within seconds, the output-generated PHXRECPHX product is completed and can be displayed at the AFOS console. It is at this time that any necessary adjustments could be made to the product before transmission.

Generally, it has been found that the results of the calculations, as displayed, need only minor adjustments, if at all, to the maximum temperature forecasts. However, somewhat more frequent adjustments need to be made to the less precise minimum temperature calculations. Minor adjustments occasionally need to be made for the precipitation probabilities. The situations where the output most often requires adjustment seem to be when the weather conditions at the key station and the appropriate zone stations are expected to differ significantly enough to upset the basic relationship. Among examples of these situations are local fog or low clouds, areas with snow on the ground, local winds, isolated areas of precipitation, and intervening airmass boundaries. Similarly, situations where only a portion of a zone has clouds (for example, lingering clouds in the wake of an exiting storm) should be included for consideration.

During persistent weather regimes, it has proven beneficial to compute a quick verification of the maximum temperature forecast from the past several days. A comparison of the observed maximums against the maximums forecasted from the stratification process can occasionally identify a temporary bias in the stratification process at a given zone station. This bias could then be applied to the current forecast, provided the prevailing persistent regime is expected to continue into the next appropriate forecast period.

5. CONCLUSIONS

The results of this study sufficiently support the original hypothesis that normal monthly deviation relationships of maximum temperature between a given zone station and its key station are largely unrepresentative during anomalous weather regimes. A much stronger relationship has been identified using a temperature- and seasonally-dependent mean difference or deviation between the maximum temperature at a given zone station, and that of the respective key station.

The observed maximum temperature at a key station is accepted as generally being a function of the overall synoptic regime operative at the time. The study helped to validate the premise that, in general, maximum temperatures at each zone station are dependent upon the actual value of the maximum temperature at the respective key station. It follows that the maximum temperature at the zone stations can be related indirectly to the character of the overall existing synoptic regime as well.

The wide range of variation in the magnitude of the mean deviation of the maximum temperature between each zone and respective key station strongly suggests a sensitivity and dependence upon the overall characteristic of the synoptic regime which produced the observed key station maximum. It is therefore likely that similar synoptic regimes can typically be expected to produce similar deviations between a given zone and key station. However, subjective adjustments to the mean deviations must be considered during synoptic situations where the basic dependence relationship may be altered.

In the case of minimum temperature relationships, it appears that the basic dependence relationship is too easily overcome by small-scale effects. The resulting less conservative nature of minimum temperatures therefore increases the possible need for a regression analysis at each zone station to assist in determining the average effects of each small-scale parameter on eventual observed minimum temperature. The results of this analysis, if satisfactory, could perhaps then be applied to the value obtained at the zone station from using the normal monthly difference in minimum temperatures between the key and zone station.

Acknowledgements

Special thanks to Dave Toronto. Without his programming expertise, I would still be trying to operationally automate the results of this study.

ARIZONA

STATUTE MILES

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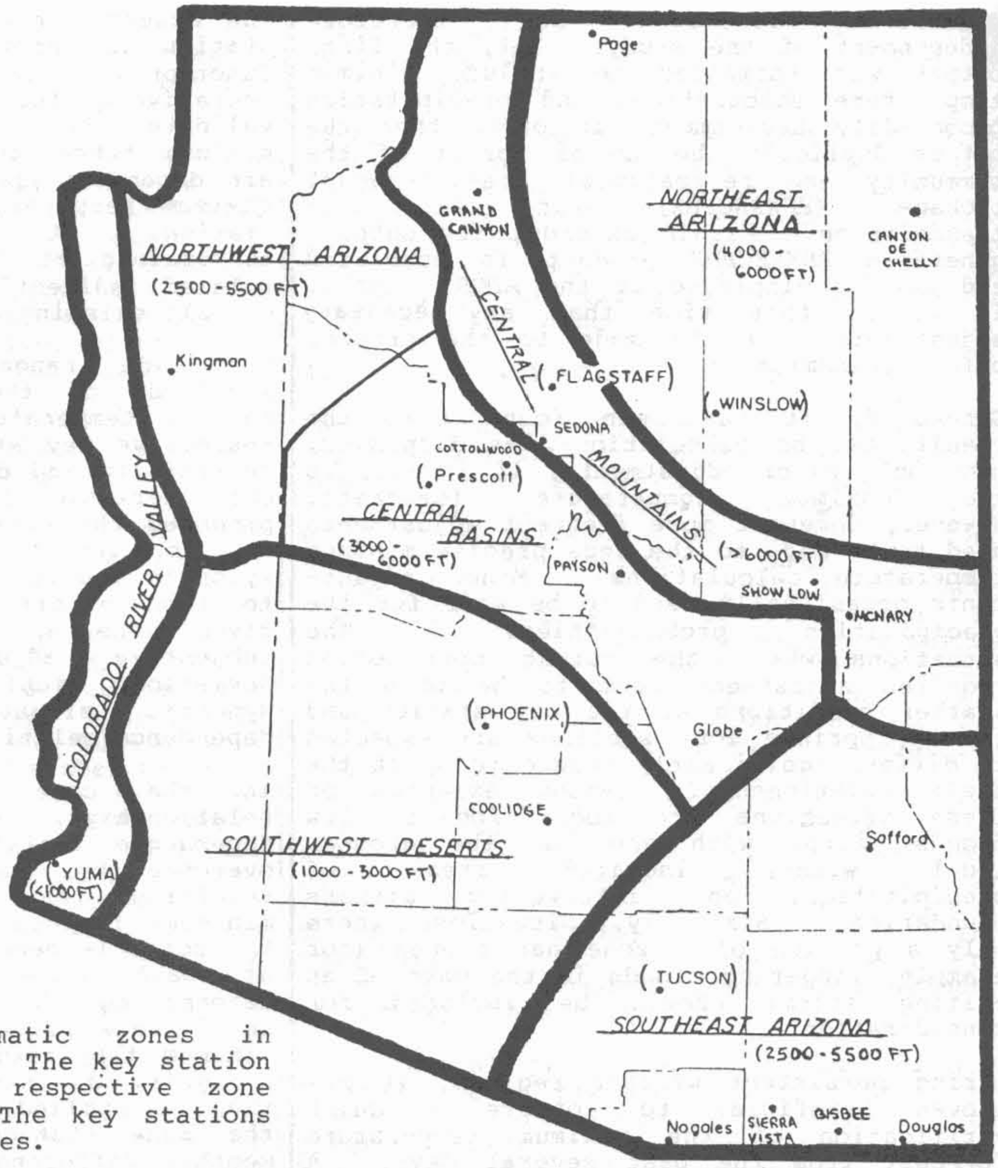

Figure 1. The six climatic zones in Arizona used in the study. The key station for each zone and the respective zone stations are indicated. The key stations are designated by parentheses.

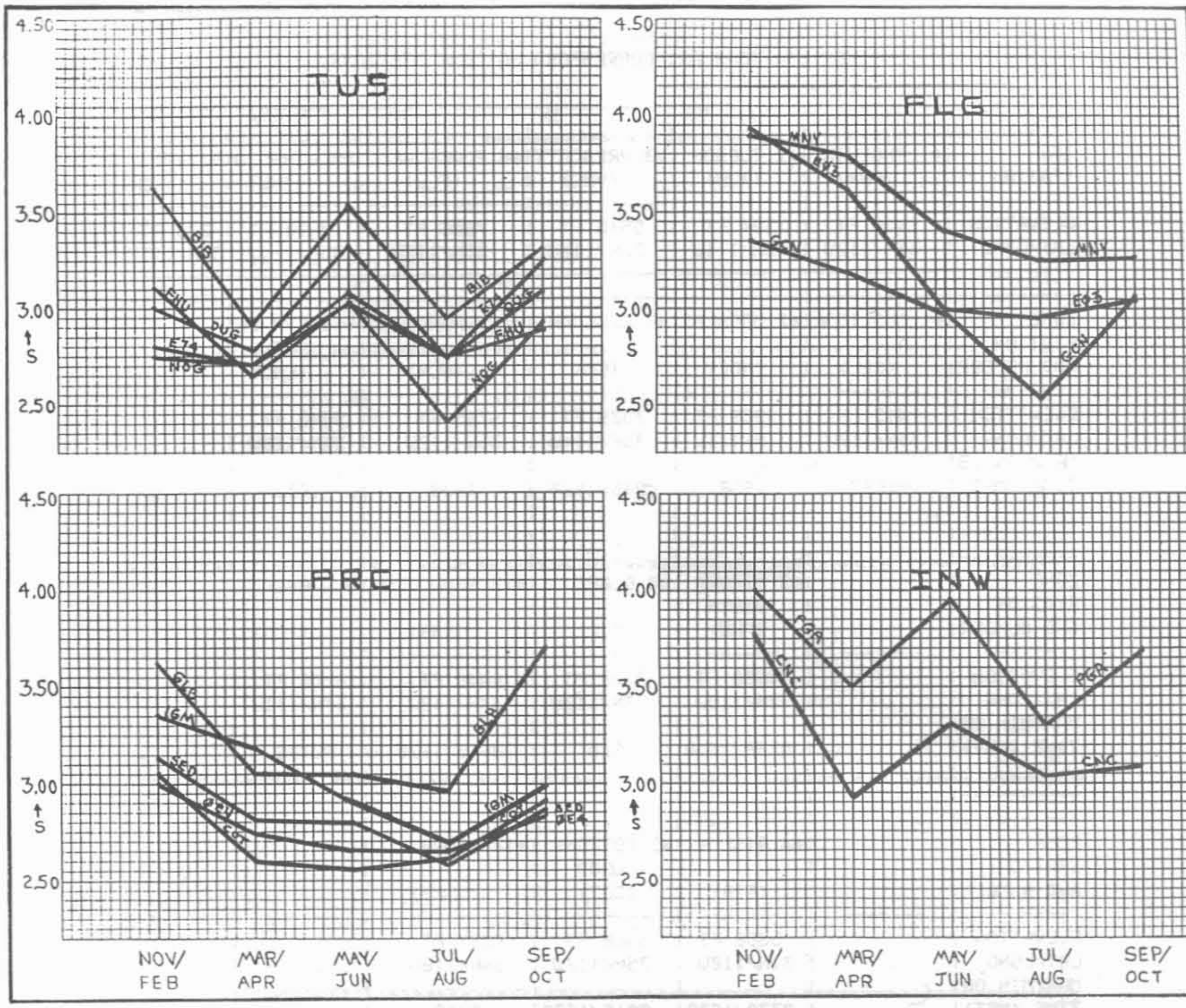

Figure 2. Comparisons of standard deviation (S) between zone stations within each climatic zone.

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KEY STATIONS AND CORRESPONDING ZONE STATIONS

KEY STATION	#1 PHOENIX (PHX)	#2 TUCSON (TUS)	#3 PRESCOTT (PRC)	#4 FLAGSTAFF (FLG)	#5 WINSLOW (INW)	#6 YUMA (YUM)
ELEVATION	1110 FT	2584 FT	5510 FT	7006 FT	4890 FT	206 FT
LAT/LONG	33N/112W	32N/111W	35N/112W	35N/112W	35N/111W	33N/115W
ZONE STATION AND NUMBER	#1 COOLIDGE (COL)	#2 NOGALES (NOG)	#7 KINGMAN (IGM)	#12 GRAND CYN (GCN)	#15 CYN DE CHELLY (CNC)	-----
ELEVATION	1419 FT	3808 FT	3539 FT	6785 FT	5540 FT	
LAT/LONG	33N/112W	31N/111W	35N/114W	36N/112W	36N/110W	
MAX/MIN OB TIME (MST)	1630	1630	0815/1630	1600	1630	
ZONE STATION AND NUMBER	-------	#3 SIERRA VISTA (FHU)	#8 GLOBE (GLB)	#13 SHOW LOW (E03)	#16 PAGE (PGA)	-----
ELEVATION		4600 FT	3650 FT	6440 FT	4270 FT	
LAT/LONG		32N/110W	33N/111W	34N/110W	37N/111W	
MAX/MIN OB TIME (MST)		0730/1630	1630	0815/1630	AUTOB	
ZONE STATION AND NUMBER	-------	#4 BISBEE (BIB)	#9 COTTON-WOOD (COT)	#14 MCNARY (MNY)	------	-----
ELEVATION		5306 FT	3360 FT	7320 FT		
LAT/LONG		31N/110W	35N/112W	34N/110W		
MAX/MIN OB TIME (MST)		0730/1630	0815/1630	0815		
ZONE STATION AND NUMBER	-------	#5 DOUGLAS (DUG)	#10 SEDONA (SED)	---------	------	-----
ELEVATION		4098 FT	4220 FT			
LAT/LONG		31N/110W	35N/112W			
MAX/MIN OB TIME (MST)		0830/1700	0815/1630			
ZONE STATION AND NUMBER	-------	#6 SAFFORD (E74)	#11 PAYSON (0E4)	---------	------	-----
ELEVATION		2954 FT	4913 FT			
LAT/LONG		33N/110W	34N/111W			
MAX/MIN OB TIME (MST)		0815/1630	0800/1700			

Table 1. Key stations and affiliated zone stations, including elevations, latitude and longitude, as well as the time of the maximum/minimum zone station observation.

MONTHS-MARCH/APRIL KEY STATION-INW

KEY STATION TEMP. RANGE	36-40	41-45	46-50	<--- TO --->	81-85
1972 CNC	44	44	47,49,50,51		78,79,76,78,77,73,76
PGA	47	46	54,54,50,53		83,81,81,82,81,83,81
1973 CNC	45	46,46	48,47,47		77,73,77,76,77
PGA	45	48,48	50,54,50		75,78,79,79,78
V	V	V	V	V	V
1981 CNC	44	46,46	48,47,48		79,81,81
PGA	46	48,49	50,52,54		73,78,76

Table 2. Sample maximum temperature data tabulation form for the seasonal period March/April at the key station Winslow.

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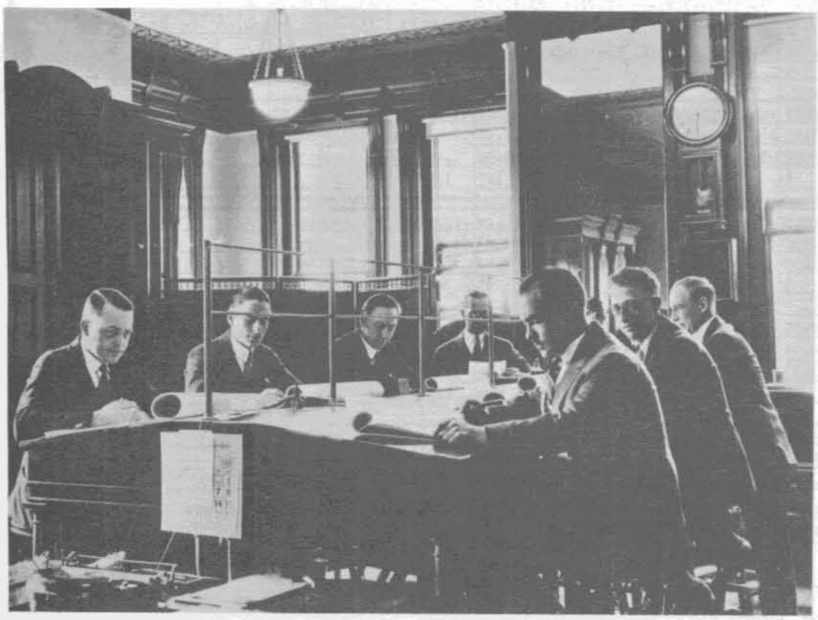
KEY STN.	KEY STN. RANGE FOR MAXIMUMS		6–10	11–15	16–20	21–25	26–30	31–35	36–40	41–45	46–50	51–55	56–60	61–65	66–70	71–75	76–80	81–85	86–90	91–95	96–100	101–105	106–110
TUS (NOV–FEB)	NOG	DEV							-2.00	- .59	+ .39	+ .97	+ .85	+ .78	+ .23	- .30	-1.05	-1.81	-2.68				
		X̄							36.00	42.41	48.39	53.97	58.85	63.78	68.23	72.70	76.95	81.19	85.32				
		S							1.41	2.00	2.23	2.70	3.17	3.06	3.38	3.43	2.93	3.21	2.73				
		N							2	5	33	75	170	214	265	197	139	65	9				
	FHU	DEV							-7.46	-6.33	-4.90	-3.80	-4.22	-4.07	-4.00	-4.48	-5.11	-5.75	-7.67				
		X̄							30.54	36.67	43.10	49.20	53.78	58.93	64.00	68.52	72.89	77.25	80.33				
		S							3.06	2.61	2.57	3.55	3.98	3.65	3.76	3.59	3.23	2.94	1.22				
		N							3	6	34	76	170	208	256	191	133	64	9				
	BIB	DEV							-8.33	-6.50	-5.33	-4.87	-5.31	-5.62	-6.08	-7.13	-7.73	-8.57	-10.55				
		X̄							29.67	36.50	42.67	48.13	52.69	57.38	61.92	65.87	70.27	74.43	77.45				
		S							1.53	3.79	3.70	4.42	4.25	4.25	4.46	4.00	3.82	3.33	2.37				
		N							3	6	35	78	179	216	269	197	139	65	9				
	DUG	DEV							-5.34	-3.70	-2.44	-2.31	-2.37	-2.40	-2.84	-3.32	-4.14	-4.72	-6.56				
		X̄							32.66	39.30	45.56	50.69	55.63	60.60	65.16	69.68	73.86	78.28	81.44				
		S							1.08	2.28	2.82	3.58	4.09	3.99	3.84	3.36	3.10	3.02	1.94				
		N							3	6	35	78	180	217	272	197	140	65	9				
	E74	DEV							-3.10	-2.50	-2.39	-2.14	-2.95	-3.60	-4.62	-4.89	-5.05	-5.15	-5.21				
		X̄							34.90	40.50	45.61	50.86	55.05	59.40	63.38	68.11	72.95	77.85	82.79				
		S							1.00	1.88	2.89	3.34	3.40	3.38	3.40	3.36	3.46	3.10	1.54				
		N							3	6	35	77	178	216	270	197	140	66	9				
TUS (MAR–APR)	NOG	DEV									+1.33	+ .36	+ .06	- .28	- .63	- .90	- .95	-1.66	-2.73	-4.30	-6.00		
		X̄									49.33	53.36	58.06	62.72	67.37	72.10	77.05	81.34	85.27	88.70	92.00		
		S									1.21	3.11	3.22	3.11	2.99	3.18	2.58	2.86	2.46	2.41			
		N									6	11	32	58	67	88	91	112	73	10	1		
	FHU	DEV									-3.33	-4.40	-4.22	-4.45	-4.91	-4.54	-4.54	-5.60	-6.70	-8.89	-12.00		
		X̄									44.67	48.60	53.78	58.55	63.09	68.46	73.46	77.40	81.30	84.11	86.00		
		S									2.10	2.40	3.41	3.38	3.10	2.89	2.62	2.26	2.13	2.25			
		N									6	10	32	57	66	84	84	110	73	9	1		
	BIB	DEV									-4.20	-4.35	-4.34	-4.42	-5.43	-4.99	-5.91	-5.68	-7.54	-10.00	-15.00		
		X̄									43.80	48.65	53.66	58.58	62.57	68.01	72.09	77.32	80.46	83.00	83.00		
		S									3.03	2.83	3.36	3.25	3.35	3.06	3.33	2.83	2.29	1.73			
		N									5	11	32	57	69	88	90	114	74	9	1		
	DUG	DEV									+ .47	-1.00	-1.31	- .95	-1.16	-1.58	-2.38	-3.09	-4.41	-7.10	-10.00		
		X̄									48.47	52.00	56.69	62.05	66.84	71.42	75.62	79.91	83.59	85.90	88.00		
		S									2.25	2.61	3.34	3.39	3.43	2.94	2.75	2.45	2.33	2.20			
		N									6	11	32	58	68	89	91	114	74	10	1		
	E74	DEV									- .50	-1.00	- .62	-1.03	-1.37	-1.60	-1.88	-1.90	-1.93	-3.40	-6.00		
		X̄									47.50	52.00	57.38	61.97	66.63	71.40	76.12	81.10	86.07	89.60	92.00		
		S									1.64	2.79	2.78	3.24	3.30	3.21	3.09	2.46	2.39	2.27			
		N									6	11	32	58	67	88	91	114	74	10	1		
TUS (MAY–JUN)	NOG	DEV													+ .17	- .56	-1.81	-3.23	-3.73	-4.17	-4.35	-4.13	-3.95
		X̄													68.17	72.44	76.19	79.77	84.27	88.83	93.65	98.87	104.05
		S													5.12	2.81	3.89	3.16	2.73	2.76	2.47	2.37	1.97
		N													6	13	25	60	129	133	106	115	41
	FHU	DEV													-2.15	-3.25	-4.30	-5.64	-6.85	-6.84	-7.21	-7.22	-6.97
		X̄													65.85	69.75	73.70	77.36	81.15	86.16	90.79	95.78	101.03
		S													5.21	5.00	3.33	2.34	2.34	2.36	2.36	2.33	2.10
		N													6	3	25	59	128	131	108	113	36
	BIB	DEV													-2.83	-2.77	-4.47	-6.24	-7.00	-7.63	-8.01	-7.84	-7.63
		X̄													65.57	70.23	73.53	76.76	81.00	85.37	89.99	95.16	100.37
		S													7.47	4.00	2.97	3.41	3.11	2.89	2.92	2.65	2.41
		N													6	13	25	59	133	136	107	117	41
	DUG	DEV													+ .67	0.00	-1.21	-2.61	-4.08	-4.65	-4.53	-4.75	-4.50
		X̄													68.67	73.00	76.79	80.39	83.92	88.35	93.47	98.25	103.50
		S													6.22	4.95	3.46	2.83	2.67	2.52	2.64	2.52	2.19
		N													6	13	25	60	133	137	109	116	41
	E74	DEV													+1.33	+ .77	- .24	- .59	- .74	- .74	- .92	- .95	- .87
		X̄													69.33	73.77	77.76	82.41	87.26	92.26	97.08	102.05	107.13
		S													3.25	5.04	3.71	3.13	2.93	2.48	2.59	2.53	2.09
		N													6	13	25	59	133	136	109	114	40

Table 3. Data tables for the Southeast Arizona zone. For each five-degree temperature range at the key station, the values of the mean temperature (X), the deviation (DEV) of that mean temperature from the midpoint of the temperature range, the standard deviation (S), and the sample size (N) are listed by key station and seasonal period.

Table 3, continued

KEY STN.	KEY STN. RANGE FOR MAXIMUMS		6–10	11–15	16–20	21–25	26–30	31–35	36–40	41–45	46–50	51–55	56–60	61–65	66–70	71–75	76–80	81–85	86–90	91–95	96–100	101–105	106–110
		DEV																-1.90	-3.59	-4.50	-5.64	-6.03	-6.40
TUS		$\bar{X}$																81.10	84.41	88.50	92.36	96.97	101.60
(JUL–	NOG	S																1.73	2.85	2.66	2.50	2.58	2.06
AUG)		N																10	54	157	.266	164	25
		DEV																-4.47	-6.33	-7.47	-8.56	-9.10	-9.71
		$\bar{X}$																78.53	81.67	85.53	89.44	93.90	98.29
	FHU	S																2.90	2.93	2.88	2.90	2.82	2.01
		N																11	56	156	262	162	24
		DEV																-6.55	-7.82	-8.54	-9.46	-9.76	-9.94
		$\bar{X}$																76.45	80.18	84.46	88.54	93.24	98.06
	BIB	S																3.21	3.35	3.39	3.21	2.50	2.02
		N																11	55	158	267	165	25
		DEV																-2.36	-3.38	-4.72	-6.17	-6.55	-6.84
		$\bar{X}$																80.64	84.62	88.28	91.83	96.45	101.16
	DUG	S																2.62	2.90	2.82	2.83	2.54	2.72
		N																11	57	159	268	165	25
		DEV																+2.64	+1.57	+ .43	- .73	-1.57	-2.46
		$\bar{X}$																85.64	89.57	93.43	97.27	101.43	105.54
	E74	S																2.16	3.34	3.26	2.99	2.41	2.13
		N																11	55	158	266	164	25
		DEV										+6.00	+4.67	+3.20	+2.04	+1.49	+ .22	-1.20	-2.27	-3.44	-4.82	-5.90	
TUS		$\bar{X}$										59.00	62.67	66.20	70.04	74.49	78.22	81.80	85.73	89.56	93.18	97.10	
(SEP–	NOG	S										3.41	2.52	3.16	3.02	2.96	3.14	3.13	2.84	2.58	2.71	2.75	
OCT)		N										3	3	10	23	38	43	90	124	171	82	20	
		DEV										- .46	-1.47	-2.40	-3.36	-4.24	-5.45	-6.43	-6.79	-7.44	-8.53	-9.80	
		$\bar{X}$										52.54	56.53	60.60	64.64	68.76	72.55	76.57	81.21	85.56	89.47	93.20	
	FHU	S										2.49	2.31	2.91	3.26	2.92	3.28	3.10	2.96	2.79	2.59	3.30	
		N										3	3	10	22	37	42	86	124	171	79	20	
		DEV										-1.53	-2.83	-4.00	-4.59	-5.59	-6.67	-8.12	-8.38	-8.41	-8.89	-10.30	
		$\bar{X}$										51.47	55.17	59.00	63.41	67.41	71.33	74.88	79.62	84.59	89.11	92.70	
	BIB	S										2.31	3.21	3.80	3.60	3.58	3.95	3.50	3.76	3.12	2.52	3.21	
		N										3	3	10	23	37	43	40	124	173	82	20	
		DEV										+2.27	+1.43	+ .45	-1.09	-2.44	-2.95	-3.62	-4.78	-5.47	-6.56	-7.60	
		$\bar{X}$										55.27	59.43	63.45	66.91	70.56	75.05	79.38	83.22	87.53	91.44	95.40	
	DUG	S										2.31	3.21	3.81	3.93	3.21	3.47	3.44	3.12	2.80	2.46	2.11	
		N										3	3	10	23	38	43	90	124	173	82	20	
		DEV										+2.33	+1.10	- .20	- .77	-1.43	-1.84	-2.32	-2.41	-2.46	-2.75	-3.56	
		$\bar{X}$										55.33	59.10	62.80	67.23	71.57	76.16	80.68	85.59	90.54	95.25	99.44	
	E74	S										4.00	3.48	3.41	3.21	2.99	3.44	3.44	3.36	3.20	2.76	2.48	
		N										3	3	10	23	37	42	88	124	173	81	20	



Tired of the "baby blue" AFOS look? Long for the good "olde" days of yesteryear? This picture shows forecasters at work in the Weather Bureau Forecast Office in 1926. If you recognize anyone, let us know.

KEY STN.	KEY STN. RANGE FOR MAXIMUMS		6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-70	71-75	76-80	81-85	86-90	91-95	96-100	101-105	106-110
PRC (NOV-FEB)	IGM	DEV				+7.67	+7.05	+6.48	+5.94	+5.25	+4.66	+3.61	+3.07	+2.49	+1.90	+1.33	+ .75						
		$\bar{X}$				30.67	35.05	39.48	43.94	48.25	52.66	56.61	61.07	65.49	69.90	74.33	78.75						
		S				1.53	3.00	3.36	3.93	3.85	3.64	3.73	3.54	3.50	3.52	3.36	3.39						
		N				3	4	27	87	132	168	233	218	174	93	46	16						
	GLB	DEV				+10.50	+9.95	+9.39	+8.87	+8.14	+7.01	+5.58	+4.16	+3.23	+1.93	+1.10	+ .48						
		$\bar{X}$				33.50	37.95	42.39	46.87	51.14	55.01	58.58	62.16	66.23	69.93	74.10	78.48						
		S				2.12	2.22	3.40	4.32	3.56	4.42	4.21	4.35	4.28	4.37	3.60	2.56						
		N				2	4	22	76	115	149	207	196	143	80	40	13						
	COT	DEV				+11.00	+10.05	+9.00	+9.38	+8.86	+8.03	+6.99	+6.37	+5.82	+4.81	+3.65	+3.00						
		$\bar{X}$				34.00	38.05	42.00	47.38	51.86	56.03	59.99	64.37	68.82	72.81	76.65	81.00						
		S				1.00	.82	2.45	3.23	3.34	3.67	3.62	3.64	3.54	3.83	4.26	3.20						
		N				3	4	19	69	108	147	201	185	154	85	40	15						
	SED	DEV				+5.33	+5.25	+4.95	+4.87	+4.43	+3.97	+3.47	+3.09	+2.86	+2.47	+2.13	+1.53						
		$\bar{X}$				28.33	33.25	37.95	42.87	47.43	51.97	56.47	61.09	65.86	70.47	75.13	79.53						
		S				1.15	3.87	3.29	3.46	3.41	3.38	3.47	3.03	3.45	3.00	2.99	3.00						
		N				3	4	22	68	100	134	186	174	141	73	40	15						
	OE4	DEV				+7.67	+5.75	+3.93	+3.54	+3.20	+2.77	+2.07	+1.41	+ .84	- .17	-1.00	-1.55						
		$\bar{X}$				30.67	33.75	36.93	41.54	46.20	50.77	55.07	59.41	63.84	67.83	72.00	76.45						
		S				4.51	2.22	2.76	3.16	3.37	3.27	3.36	2.92	3.19	3.04	2.47	1.84						
		N				3	4	27	86	130	164	223	216	171	92	45	16						
PRC (MAR-APR)	IGM	DEV						+7.40	+6.54	+5.82	+5.36	+4.87	+4.96	+4.52	+4.92	+5.02	+5.12	+5.00					
		$\bar{X}$						40.40	44.54	48.82	53.36	57.87	62.96	67.52	72.92	78.02	83.12	88.00					
		S						3.29	3.07	3.81	3.62	3.86	2.94	3.03	2.84	2.79	2.57						
		N						5	14	43	61	61	84	81	93	86	25	1					
	GLB	DEV						+9.20	+9.15	+9.53	+9.93	+9.63	+9.57	+9.77	+8.99	+8.00	+7.14	+5.00					
		$\bar{X}$						42.20	47.15	52.53	57.93	62.63	67.57	72.77	76.99	81.00	85.14	88.00					
		S						1.79	1.58	3.14	3.38	3.58	3.74	4.01	3.23	3.30	2.76						
		N						5	12	40	54	54	77	70	85	75	21	1					
	COT	DEV						+10.00	+9.50	+9.71	+10.18	+9.93	+10.16	+10.26	+9.78	+9.69	+8.50	+7.00					
		$\bar{X}$						43.00	47.50	52.71	58.18	62.93	68.16	73.26	77.78	82.69	86.50	90.00					
		S						2.46	2.54	3.13	2.69	2.86	2.73	2.64	2.82	2.28	1.84						
		N						4	12	38	56	54	73	73	83	78	23	1					
	SED	DEV						+5.80	+5.75	+5.57	+5.80	+6.17	+6.51	+6.63	+6.68	+7.09	+6.05						
		$\bar{X}$						38.80	43.75	48.57	53.80	59.17	64.51	69.63	74.68	80.09	84.05						
		S						2.59	2.74	3.10	2.82	2.78	3.20	2.87	2.94	2.55	2.53						
		N						5	12	35	54	54	68	75	81	72	19						
	OE4	DEV						+3.00	+2.79	+3.19	+3.41	+3.28	+3.69	+4.00	+3.83	+3.48	+2.08	+0.00					
		$\bar{X}$						36.00	40.79	46.19	51.41	56.28	61.69	67.00	71.83	76.48	80.08	83.00					
		S						2.35	2.55	3.21	3.46	3.49	2.74	3.19	2.43	2.27	1.74						
		N						5	14	43	61	60	83	81	92	86	24						
PRC (MAY-JUN)	IGM	DEV									+8.20	+7.71	+8.13	+7.81	+8.26	+7.83	+7.72	+7.28	+7.12	+6.62	+6.26	+6.00	
		$\bar{X}$									56.20	60.71	66.13	70.81	76.26	80.83	85.72	90.28	95.12	99.62	104.26	109.00	
		S									2.59	3.55	3.93	3.77	3.56	2.91	2.51	2.45	2.80	2.07	1.74		
		N									5	7	15	33	58	100	128	120	92	53	27	1	
	GLB	DEV									+13.99	+13.47	+12.87	+12.32	+11.80	+11.20	+10.57	+9.69	+9.16	+8.56	+7.52	+8.00	
		$\bar{X}$									61.99	66.47	70.87	75.32	79.80	84.20	88.57	92.69	97.16	101.56	105.52	111.00	
		S									3.12	3.08	3.73	3.82	3.33	2.96	3.38	3.43	3.04	3.61	3.00		
		N									4	6	13	31	49	88	117	108	79	52	25	1	
	COT	DEV									+12.50	+11.67	+11.50	+11.61	+11.59	+11.34	+11.06	+11.00	+11.49	+11.17	+9.88		
		$\bar{X}$									60.50	64.67	69.50	74.61	79.59	84.34	89.06	94.00	99.49	104.17	107.88		
		S									2.39	2.58	3.89	3.08	2.70	2.68	2.48	2.11	2.43	2.29	1.59		
		N									5	6	15	31	57	86	113	101	74	47	25		
	SED	DEV									+8.75	+8.64	+8.62	+8.59	+8.86	+8.95	+8.80	+8.56	+8.91	+8.76	+8.27	+5.00	
		$\bar{X}$									56.75	61.64	66.62	71.59	76.86	81.95	86.80	91.56	96.91	101.76	106.27	108.00	
		S									3.86	2.91	2.99	3.68	2.87	3.17	2.74	2.76	2.86	2.15	1.54		
		N									4	7	13	33	56	91	122	114	90	51	27	1	
	OE4	DEV									+5.60	+6.00	+5.60	+5.73	+5.74	+5.27	+4.89	+4.39	+4.21	+3.74	+3.37	+2.00	
		$\bar{X}$									53.60	59.00	63.60	68.73	73.74	78.27	82.89	87.39	92.21	96.74	101.37	105.00	
		S									3.44	3.27	3.29	3.53	2.36	2.32	2.76	2.55	2.24	2.22	1.24		
		N									5	7	15	33	58	100	128	119	92	54	27	1	

Table 4. Same as Table 3 but for the Northwest Arizona central basin zone.

KEY STN.	KEY STN. RANGE FOR MAXIMUMS			6–10	11–15	16–20	21–25	26–30	31–35	36–40	41–45	46–50	51–55	56–60	61–65	66–70	71–75	76–80	81–85	86–90	91–95	96–100	101–105	106–110
			DEV														+11.56	+10.45	+9.44	+8.45	+7.29	+6.28		
PRC			X̄														84.56	88.45	92.44	96.45	100.29	104.28		
(JUL–		IGM	S														2.85	2.97	2.71	2.53	2.60	2.51		
AUG)			N														16	66	197	229	150	25		
			DEV														+13.14	+11.42	+10.38	+9.17	+7.76	+6.50		
			X̄														86.14	89.42	93.38	97.17	100.76	104.50		
		GLB	S														2.80	3.47	3.07	2.86	2.84	2.76		
			N														14	64	179	216	131	24		
			DEV														+13.51	+12.72	+11.67	+10.92	+10.38	+9.22		
			X̄														86.51	90.72	94.67	98.92	103.38	107.22		
		COT	S														2.72	3.39	2.88	2.61	2.49	2.18		
			N														14	54	169	198	129	18		
			DEV														+11.27	+10.68	+10.09	+9.45	+8.82	+7.67		
			X̄														84.27	88.68	93.09	97.45	101.82	105.67		
		SED	S														2.75	3.16	2.61	2.47	2.45	2.06		
			N														13	66	188	214	142	24		
			DEV														+8.20	+6.32	+5.10	+4.01	+3.05	+1.75		
			X̄														81.20	84.32	88.10	92.01	96.05	99.75		
		OE4	S														2.54	3.13	2.62	2.53	2.64	2.38		
			N														15	66	196	229	147	24		
			DEV								+9.25	+8.42	+6.88	+6.65	+6.79	+6.76	+6.68	+6.87	+7.34	+6.97	+6.48			
PRC			X̄								52.25	56.42	59.88	64.65	69.79	74.76	79.68	84.87	90.34	94.97	99.48			
(SEP–		IGM	S								3.30	2.97	3.44	3.01	2.99	3.21	3.69	3.35	2.66	2.46	1.86			
OCT)			N								4	12	17	26	34	59	103	138	131	62	19			
			DEV								+9.50	+9.27	+7.93	+8.00	+7.86	+8.20	+8.44	+8.07	+7.63	+7.14	+6.11			
			X̄								52.50	57.27	60.93	66.00	70.86	76.20	81.44	86.07	90.63	95.14	99.11			
		GLB	S								5.20	3.20	3.49	3.10	2.71	3.75	4.13	3.87	4.18	3.79	3.14			
			N								4	11	15	23	28	51	94	128	122	59	18			
			DEV								+10.00	+9.80	+9.50	+9.50	+9.62	+10.11	+9.79	+9.78	+9.81	+9.82	+9.67			
			X̄								53.00	57.80	62.50	67.50	72.62	78.11	82.79	87.78	92.81	97.82	101.67			
		COT	S								4.36	3.83	2.99	2.94	2.26	3.13	2.96	2.57	2.85	2.37	1.81			
			N								3	5	16	22	29	53	89	120	118	57	18			
			DEV								+7.48	+7.76	+7.73	+7.31	+6.87	+7.00	+7.09	+7.28	+7.44	+7.36	+6.42			
			X̄								50.48	55.76	60.73	65.31	69.87	75.00	80.09	85.28	90.44	95.36	99.42			
		SED	S								2.12	3.60	2.91	2.92	2.79	2.81	3.30	3.41	2.97	2.56	2.14			
			N								2	7	15	24	30	58	98	124	118	59	19			
			DEV								+4.35	+4.42	+4.05	+3.58	+3.64	+3.63	+4.04	+3.62	+3.52	+3.46	+1.44			
			X̄								47.35	52.42	57.05	61.58	66.64	71.63	77.04	81.62	86.52	91.46	94.44			
		OE4	S								2.22	3.92	2.65	3.01	3.01	3.11	3.33	2.82	2.71	2.60	2.12			
			N								4	11	17	26	34	59	103	137	129	61	19			

Table 4, continued

KEY STN.	KEY STN. RANGE FOR MAXIMUMS		6–10	11–15	16–20	21–25	26–30	31–35	36–40	41–45	46–50	51–55	56–60	61–65	66–70	71–75	76–80	81–85	86–90	91–95	96–100	101–105	106–110
		DEV	+8.00	+6.27	+4.88	+4.17	+3.22	+2.58	+1.98	+1.46	+ .78	+ .23	-1.05	-2.48	-3.79	-5.50							
FLG		X̄	16.00	19.27	22.88	27.17	31.22	35.58	39.98	44.46	48.78	53.23	56.95	60.52	64.21	67.50							
(NOV–	GCN	S		1.15	3.56	4.28	3.58	3.55	3.56	3.54	3.55	3.81	3.40	3.34	3.00	3.24							
FEB)		N	1	3	8	23	66	131	168	210	211	176	87	52	43	8							
		DEV	+14.00	+11.40	+9.10	+7.36	+5.75	+4.69	+4.07	+2.57	+2.83	+2.04	+1.92	- .16	- .71	-1.87							
		X̄	22.00	24.40	27.10	30.36	33.75	37.69	42.07	45.57	50.83	55.04	59.92	62.84	67.29	71.13							
	EO3	S		1.00	3.71	4.05	4.10	3.93	4.23	4.36	4.44	4.36	4.39	4.19	4.36	4.11							
		N	1	3	9	24	63	132	169	208	203	170	87	50	42	8							
		DEV	+14.00	+10.82	+8.32	+5.92	+4.12	+3.34	+3.27	+3.17	+3.16	+2.77	+1.69	+ .44	- .93	-3.20							
		X̄	22.00	23.82	26.32	28.92	32.12	36.34	41.27	46.17	51.16	55.77	59.69	63.44	67.07	69.80							
	MNY	S		.71	3.08	4.34	4.42	4.22	4.04	4.19	4.32	4.05	4.25	4.33	4.44	4.40							
		N	1	2	7	19	58	123	146	174	192	145	79	50	42	5							
		DEV				-1.00	+1.09	+2.31	+2.45	+2.43	+2.30	+1.62	+ .95	+ .38	- .68	-2.25							
FLG		X̄				22.00	29.09	35.31	40.45	45.43	50.30	54.62	58.95	63.38	67.32	70.75							
(MAR–	GCN	S					3.49	3.37	2.59	3.62	3.57	3.23	3.31	3.08	3.20	2.42							
APR)		N				1	11	32	61	64	57	74	79	96	50	12							
		DEV				+3.00	+3.60	+4.78	+5.48	+5.34	+5.43	+5.27	+4.94	+4.05	+3.35	+ .17							
		X̄				26.00	31.60	37.78	43.48	48.34	53.43	58.27	62.94	67.05	71.35	73.17							
	EO3	S					3.53	3.67	3.92	3.90	4.33	3.62	3.68	3.29	3.35	2.92							
		N				1	10	32	60	64	58	73	83	101	49	12							
		DEV				+1.00	+1.89	+2.48	+3.29	+2.79	+2.77	+2.78	+3.17	+2.33	+1.36	-1.36							
		X̄				24.00	29.89	35.48	41.29	45.79	50.77	55.78	61.17	65.33	69.36	71.64							
	MNY	S					2.76	3.12	4.03	3.99	4.85	3.98	4.32	3.87	4.14	2.82							
		N				1	9	27	49	53	48	60	66	93	47	11							
		DEV							+3.75	+2.75	+2.00	+1.82	+2.25	+2.47	+2.02	+1.53	+1.11	+ .89	+ .50	+ .14			
FLG		X̄							41.75	45.75	50.00	54.82	60.25	65.47	70.02	74.53	79.11	83.89	88.50	93.14			
(MAY–	GCN	S							1.89	2.06	2.73	3.57	4.41	4.25	3.95	3.13	2.78	2.75	1.94	2.19			
JUN)		N							4	4	8	17	29	78	103	109	111	84	58	22			
		DEV							+8.04	+6.54	+5.57	+5.82	+5.47	+5.34	+4.87	+4.93	+4.48	+3.98	+3.48	+2.44			
		X̄							46.04	49.54	53.57	58.82	63.47	68.34	72.87	77.93	82.48	86.98	91.48	95.44			
	EO3	S							2.30	2.43	2.99	3.53	3.87	3.61	3.58	2.97	3.30	2.77	2.41	2.04			
		N							4	4	7	17	29	82	105	107	104	83	56	22			
		DEV							+4.25	+3.17	+2.82	+3.23	+3.48	+3.42	+2.99	+2.78	+2.33	+2.44	+2.20	+ .56			
		X̄							42.25	46.17	50.82	56.23	61.48	66.42	70.99	75.78	80.33	85.44	90.20	93.56			
	MNY	S							2.06	2.08	3.44	3.52	4.23	4.38	4.32	3.73	4.14	3.99	2.76	2.31			
		N							4	3	7	16	28	72	91	105	90	77	50	17			
		DEV												+5.60	+4.67	+3.76	+2.53	+1.55	+ .52	- .16	-1.00		
FLG		X̄												68.60	72.67	76.76	80.53	84.55	88.52	92.84	97.00		
(JUL–	GCN	S												1.95	2.64	3.26	2.90	2.76	2.32	1.89			
AUG)		N												5	15	71	186	234	145	18			
		DEV												+8.80	+6.93	+5.44	+4.20	+2.71	+1.62	+ .17	-1.00		
		X̄												71.80	74.93	78.44	82.20	85.71	89.62	93.17	97.00		
	EO3	S												2.77	2.74	3.00	3.22	3.49	3.10	2.64			
		N												5	15	71	183	228	138	18	1		
		DEV												+7.25	+5.10	+2.67	+ .62	-1.81	-3.59	-5.86	-8.00		
		X̄												70.25	73.10	75.67	78.62	81.19	84.41	87.14	90.00		
	MNY	S												2.63	3.63	3.75	3.67	3.92	3.27	1.88			
		N												4	10	63	165	211	112	14	1		
		DEV						+3.40	+2.75	+2.13	+1.95	+2.10	+1.60	+1.18	+ .78	+ .70	+ .40	+ .28	- .75				
FLG		X̄						36.40	40.75	45.13	49.95	55.10	59.60	64.18	68.78	73.70	78.40	83.28	87.25				
(SEP–	GCN	S						2.27	2.06	2.64	3.84	3.67	3.82	4.01	3.57	3.50	3.29	2.38	1.83				
OCT)		N						5	4	15	21	21	45	66	102	150	115	46	8				
		DEV						+6.20	+5.38	+4.83	+4.43	+4.30	+4.05	+3.61	+3.17	+3.33	+2.89	+2.58	+1.64				
		X̄						39.20	43.38	47.83	52.43	57.30	62.05	66.61	71.17	76.33	80.89	85.58	89.64				
	EO3	S						2.39	2.49	3.26	3.39	3.31	3.34	3.36	3.45	3.46	3.33	2.57	1.98				
		N						5	4	15	23	20	45	66	101	148	112	47	8				
		DEV						+5.00	+4.43	+3.60	+2.88	+2.43	+2.00	+1.56	+1.09	+ .64	+ .18	- .23	- .56				
		X̄						38.00	42.43	46.60	50.88	55.43	60.00	64.56	69.06	73.64	78.18	82.77	87.44				
	MNY	S						1.92	1.53	3.26	3.91	3.64	3.90	4.27	4.23	4.12	3.38	3.38	1.74				
		N						5	3	12	19	17	41	54	96	131	98	42	9				

Table 5. Same as Table 3 but for the central mountains zone.

KEY STN.	KEY STN. RANGE FOR MAXIMUMS		6–10	11–15	16–20	21–25	26–30	31–35	36–40	41–45	46–50	51–55	56–60	61–65	66–70	71–75	76–80	81–85	86–90	91–95	96–100	101–105	106–110
		DEV			+6.00	+3.82	+1.62	- .84	-1.39	-2.87	-3.65	-4.01	-3.85	-4.19	-4.04	-3.61	-4.08						
INW		$\bar{X}$			24.00	26.82	29.62	32.16	36.61	40.13	44.35	48.99	54.15	58.81	63.96	69.39	73.92						
(NOV–	CNC	S			3.04	3.46	4.27	4.33	4.33	4.38	4.38	4.36	4.31	4.20	3.23	2.46	2.37						
FEB)		N			5	11	33	61	86	141	183	227	159	117	74	36	12						
		DEV			+9.95	+7.40	+4.65	+2.00	- .48	-2.11	-3.78	-5.42	-6.51	-7.79	-8.35	-8.89	-10.09						
		$\bar{X}$			27.95	30.40	32.65	35.00	37.52	40.89	44.22	47.58	51.49	55.21	59.65	64.11	67.91						
	PGA	S			3.11	3.44	4.40	4.16	4.42	4.48	4.46	4.42	4.36	4.35	3.91	3.26	3.21						
		N			4	12	33	58	84	131	173	204	152	113	71	35	11						
		DEV							+4.37	+ .76	-2.46	-4.36	-4.43	-4.35	-3.89	-3.53	-4.56	-5.64					
INW		$\bar{X}$							42.37	43.76	45.54	48.64	53.57	58.65	64.11	69.47	73.44	77.36					
(MAR–	CNC	S							1.83	3.02	3.35	3.16	3.47	3.39	3.32	3.17	2.50	1.99					
APR)		N							6	14	37	64	65	72	79	81	85	28					
		DEV							+3.40	+1.45	- .12	-1.65	-2.95	-3.03	-2.93	-2.89	-3.51	-4.52					
		$\bar{X}$							41.40	44.45	47.88	51.35	55.05	59.97	65.07	70.11	74.49	78.48					
	PGA	S							2.88	2.94	2.70	2.96	3.42	3.15	4.14	4.29	4.28	4.12					
		N							5	11	32	60	59	62	73	75	76	22					
		DEV										+ .68	- .29	- .99	-1.59	-2.17	-2.81	-3.64	-4.21	-5.19	-5.51	-5.63	
INW		$\bar{X}$										53.68	57.71	62.01	66.41	70.83	75.19	79.36	83.79	87.81	92.49	97.37	
(MAY–	CNC	S										3.54	3.53	4.21	3.64	3.87	3.53	3.90	3.15	3.21	2.18	1.69	
JUN)		N										2	6	16	24	47	99	124	110	91	84	31	
		DEV										- .50	- .63	- .71	- .83	- .89	- .94	- .96	-1.14	-1.64	-1.88	-2.04	
		$\bar{X}$										52.50	57.37	62.29	67.17	72.11	77.06	82.04	86.86	91.36	96.12	100.96	
	PGA	S										3.54	4.41	4.45	4.30	3.93	4.42	4.47	4.39	4.01	3.44	2.11	
		N										2	6	14	23	39	76	101	91	87	76	26	
		DEV														+4.40	+2.40	+ .52	-1.95	-3.93	-4.94	-5.88	
INW		$\bar{X}$														77.40	80.40	83.52	86.05	89.07	93.06	97.12	
(JUL–	CNC	S														3.21	2.87	3.93	3.50	3.03	2.30	2.36	
AUG)		N														5	10	42	132	256	179	47	
		DEV														+1.50	+2.00	+2.47	+1.22	+ .77	- .34	-1.47	
		$\bar{X}$														74.50	80.00	85.47	89.22	93.77	97.66	101.53	
	PGA	S														2.88	3.45	3.75	3.81	3.67	3.33	2.30	
		N														5	10	34	115	229	166	45	
		DEV									-3.12	-3.00	-3.09	-2.86	-2.52	-2.69	-2.53	-2.89	-3.23	-4.06	-5.40		
INW		$\bar{X}$									44.88	50.00	54.91	60.14	65.48	70.31	75.47	80.11	84.77	88.94	92.60		
(SEP–	CNC	S									3.23	2.59	3.46	3.03	3.31	3.37	3.10	2.96	2.99	3.03	2.82		
OCT)		N									8	11	26	36	52	61	89	160	93	48	5		
		DEV									0.00	- .12	- .30	- .71	-1.17	-1.65	-1.93	-2.14	-1.75	-2.99	-3.61		
		$\bar{X}$									48.00	52.88	57.70	62.29	66.83	71.35	76.07	80.86	86.25	90.01	94.39		
	PGA	S									3.21	2.61	3.96	4.06	4.41	3.96	3.64	4.34	4.03	3.53	2.79		
		N									7	10	23	33	51	52	82	150	91	42	5		

Table 6. Same as Table 3 but for the northeast Arizona zone.

References and Footnotes

1. *Mr. Brenner received his B.S. in Meteorology from the University of Utah in 1971, and returned to do graduate work in 1974. Having started his career with the National Weather Service as a student trainee at Phoenix, Arizona during the summers of 1968, 1969, and 1970, Mr. Brenner has since been stationed at Western Region Scientific Services Division in Salt Lake City, Utah; the National Hurricane Center in Miami, Florida; and the Forecast Office in Phoenix, Arizona.*

2. *Sellers, William D., and Richard H. Hill (editors), 1974: Arizona Climate 1931-1972, University of Arizona Press, Tucson, 54 pp.*

3. *Monthly Normals of Temperature, and Heating and Cooling Degree Days 1951-80 --Arizona. Climatography of the United States No. 81, National Climatic Center, Asheville, North Carolina, pp. 1-5, Sept. 1982.*

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KEY STATION AND SEASONAL PERIOD: TUS	Individual zone station averages of standard deviation: 2-2.50	2.50-3	3-3.50	3.50-4	4-4.50	Zone average of standard deviation: 2.50-3	3-3.50	3.50-4	4-4.50
NOV - FEB			HOG/FHU DUG/E74		BIB		3.44		
MAR - APR		HOG/FHU DUG/E74	BIB			2.87			
MAY - JUN	FHU	HOG/DUG	BIB/E74			2.86			
JUL - AUG	HOG	FHU/BIB DUG/E74				2.71			
SEP - OCT		HOG	FHU/BIB DUG/E74				3.13		

KEY STATION AND SEASONAL PERIOD: FLG	Individual zone station averages of standard deviation: 2-2.50	2.50-3	3-3.50	3.50-4	4-4.50	Zone average of standard deviation: 2.50-3	3-3.50	3.50-4	4-4.50
NOV - FEB				GCH	E83/MNY				4.82
MAR - APR			GCH	E83/MNY				3.57	
MAY - JUN			GCH/E83	MNY			3.35		
JUL - AUG		GCH	E83/MNY				3.83		
SEP - OCT			GCH/E83	MNY			3.49		

KEY STATION AND SEASONAL PERIOD: PRC	Individual zone station averages of standard deviation: 2-2.50	2.50-3	3-3.50	3.50-4	4-4.50	Zone average of standard deviation: 2.50-3	3-3.50	3.50-4	4-4.50
NOV - FEB		0E4	COT/SED	IGM/GLB			3.43		
MAR - APR		COT/SED 0E4	IGM/GLB			2.92			
MAY - JUN		IGM/COT SED/0E4	GLB			2.86			
JUL - AUG		IGM/GLB COT/SED 0E4				2.72			
SEP - OCT		IGM/COT SED/0E4		GLB		2.99			

KEY STATION AND SEASONAL PERIOD: INW	Individual zone station averages of standard deviation: 2-2.50	2.50-3	3-3.50	3.50-4	4-4.50	Zone average of standard deviation: 2.50-3	3-3.50	3.50-4	4-4.50
NOV - FEB				CNC	PGA			3.96	
MAR - APR			CNC	PGA			3.30		
MAY - JUN			CNC	PGA				3.61	
JUL - AUG			CNC/PGA				3.28		
SEP - OCT			CNC	PGA			3.47		

Table 7. Analysis of standard deviation (S) by zone and seasonal period showing individual zone station averages, as well as the combined zone averages.

PATTERNS IN THE CHANGE IN [DEV]

1. LESS POSITIVE FROM COLDEST ANOMALY TO WARMEST ANOMALY
(AN * MEANS A CHANGE OF SIGN TO NEGATIVE AT THE MAJORITY OF THE ZONE STATIONS)

NOV/FEB	MAR/APR	MAY/JUN	JUL/AUG	SEP/OCT
PRC	TUS	TUS*	TUS	TUS*
FLG*	INW*	PRC	PRC	FLG*
INW*		FLG	FLG*	
		INW	INW*	

2. LITTLE CHANGE (3 DEGREES OR LESS ON THE AVERAGE) FROM THE COLDEST TO THE WARMEST ANOMALY

NOV/FEB	MAR/APR	MAY/JUN	JUL/AUG	SEP/OCT
	PRC			PRC
	FLG			INW

3. LESS POSITIVE TOWARD THE COLD AND WARM ANOMALIES

NOV/FEB	MAR/APR	MAY/JUN	JUL/AUG	SEP/OCT
TUS				

Table 8. Patterns of how the deviation (DEV) changed at the zone stations within each seasonal period.