NOAA Technical Memorandum NWS WR-179

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

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June 1983

U.S. DEPARTMENT OF COMMERCE / National Oceanic and Atmospheric Administration / National Weather Service

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Ira S. Brenner

National Weather Service Forecast Office
Phoenix, Arizona
June 1983

UNITED STATES DEPARTMENT OF COMMERCE
Malcolm Baldrige, Secretary

National Oceanic and Atmospheric Administration
John V. Byrne, Administrator

National Weather Service
Richard E. Hallgren, Director

This publication has been reviewed and is approved for publication by Scientific Services Division, Western Region.

Glenn E. Rasch

Glenn E. Rasch, Chief
Scientific Services Division
Western Region Headquarters
Salt Lake City, Utah

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

Ira S. Brenner
National Weather Service Forecast Office
Phoenix, Arizona

I. 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 (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 station as a guide to forecasting temperatures at each of the zone 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). Thus, the average monthly differences from each of the sixteen zone stations to 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 made up of extremes; and extremes are typically masked when normals are tabulated over a large period of record. In Arizona, extremes in the temperatures at a given station during a given month can be common, and can be induced by small scale changes just as easily as by adjustments of the larger scale features. 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 follow a period of unusually warm readings. During the summer monsoon season (July and August), clouds and thunderstorms can cause wide day-to-day variances in temperatures. In general, varying degrees of winds, clouds, humidity, precipitation (or lack of), and snow cover, can induce considerable day-to-day variances and anomalies in either the maximum or minimum temperature at a given station, or even within a given area of the state.

It was felt that the eventual value of the observed maximum or minimum temperature should be a direct byproduct of the overall character of the concurrent synoptic regime. For example, a high temperature of only fifty five degrees 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 anomalous high temperature of fifty five degrees in the middle of September, Douglas averages 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 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 has typically reacted by averaging two degrees warmer than Tucson.

Therefore, this study set out to substantiate the above idea by deriving a set of relationships between observed key and zone station temperatures that are temperature as well as 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.

II. DATA TABULATION

The period selected as the data base was from July 1971 through August 1981. Six key stations were selected (Figure 2). These stations included those 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). Shown as well in Figure 2 are the sixteen zone stations for which routine temperature and precipitation probability forecasts are prepared by Phoenix WSFO (under the AFOS heading PHXRECPHX).

Five characteristically similar seasonal periods were selected for the purpose of data stratification. The periods were grouped as follows:

1. November through February
2. March through April
3. May through June
4. July through August
5. September through October.

Figure 3 represents a sample of the tabulation forms used to record the maximum temperature data during the period of study. The key station Winslow is used as an example for the seasonal 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.

During the course of this data tabulation, it became obvious that "reset" maximum temperatures were going to partially contaminate the data sample. These resets occasionally occur at 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 will 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 reset their thermometers twice a day. In all but the most obvious cases, adjustments were not made, and the reset temperature was not included in the data tabulation.

Returning to the Winslow example, temperature data at each zone station 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 is preferred over the results of a separate stratification process for minimum temperatures.

III. DATA ANALYSIS AND RESULTS

This discussion will be confined to the results of the stratification process of maximum temperatures only. Data Tables I through 4 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.

One of the more positive results of this tabulation is the low standard deviations [s]. Figure 4 is a summarized analysis of [s] from the study. In Figure 4, the [s] values for each key station temperature range in the data tables were combined and averaged within each seasonal period by zone station. Only those [s] values that were derived from a data sample of [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 Figure 4. 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 portion of Figure 4.

The fact that the majority of these station averages of [s] were 3.50 degrees of less supports a strong relationship between the maximum temperature of the key station and the corresponding maximum temperature at the respective zone stations. Further, these zone station standard deviation averages were actually overwhelmingly in the 2.50 to 3.00 degree grouping for the Tucson and Prescott zones. Certainly, if the maximum temperatures at the individual zone stations were not correlated to the maximum temperatures at the corresponding key station, these standard deviation averages would have been much larger. Note as well that for each key station, it should be expected that the largest values of these zone station averages of [s] would occur during the rather changeable November through February seasonal period. Despite this, the averages within this period were still quite good, being near or below 4.00 degrees.

The individual zone station averages of standard deviation in Figure 4 also show which stations had the strongest or weakest correlations 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 (OE4) 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 Fort Huachuca (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 to the key station, to differences in elevation, to station exposure and local effects. Nevertheless, the varying degrees of these individual station relationships can be utilized in the positive sense as a confidence factor by the forecaster. The important point is that the results of the standard deviation analysis indicate that overall, the relationships between the key stations and their respective zone stations are sound.

Perhaps the foremost positive result of this study is portrayed by the 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. Data Tables 1 through 4 clearly validate this hypothesis. For nearly all zone stations, a substantial variance in [dev] occurs as one propagates away from the key station temperature ranges containing the maximum [n].

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 Figure 5. 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 Figure 5 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.

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 most common pattern, where [dev] becomes less positive (or more negative) from the coldest to the warmest anomaly, one would have expected different values of [dev] for the 36 to 40 degree range, as well as the 41 to 45 degree interval. These should have ranged from about plus two at Nogales to minus 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. These temperature inversions will typically limit the amount of 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 coldest 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 not-so-infrequent 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 modify considerably, due to downslope effects, by the time it reaches the Tucson valley. This downslope condition tends to negate the effects of the cold air at Tucson, while the remainder of the Tucson zone stations undergo rather strong low-level cold-air advection. This could possibly account for the uniqueness of this particular [dev] pattern.

IV. APPLICATIONS

The results of this study are routinely applied to the development of the community and recreational forecasts 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 precipitation 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, 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 maximum temperature forecasts, the results of the stratification process are applied toward the calculations. For minimum temperatures, calculations using normal monthly deviations from zone station to key station are performed. Probabilities at the key station are simply assigned to each zone station related to that key station.

Within seconds, a completed PHXRECPHX product can be displayed at, and even transmitted from, the AFOS console. It is at this time, however, that any adjustments that might be necessary can be made to the AFOS-generated PHXRECPHX product.

Generally, it has been found that the results of the calculations, as displayed, need only minor adjustments, if at all. This is particularly true during nonchanging regimes where unusual local effects are not operative. However, the need for subjective adjustments should be considered when the weather conditions at the key station and the appropriate zone stations are expected to differ significantly enough to upset the basic dependency relationship. Among examples of situations that could be considered are local fog or low clouds, separate areas with snow on the ground, local winds, isolated areas of precipitation, and air mass boundaries. Similarly, situations where a portion of a zone has clouds (for example, lingering clouds behind an exiting storm), while the remainder of the zone is clear, should be included for consideration.

During persistent regimes when subjective adjustments would not normally be needed, it has proven beneficial to compute a quick verification of the maximum temperature forecasts from several previous days. This check can occasionally identify a temporary bias in the stratification process at a given zone station, which could then be applied to the current forecast, provided the prevailing persistent regime is expected to continue.

V. CONCLUSIONS

The results of this study 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 was 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 validated 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 temperatures at the zone stations can be related indirectly to the character of the overall existing synoptic regime as well.

Therefore, it is concluded that the wide range of variation in the magnitude of the mean deviation of the maximum temperature between each zone and respective key station is indeed a result of sensitivity and dependency upon the overall characteristic of the synoptic regime which produced the observed key station maximum. Similar synoptic regimes can thus be expected to typically produce similar mean deviations between a given zone and key station. However, subjective adjustments to the mean deviations must be considered during situations where the basic dependency relationship is expected to be altered.

In the case of minimum temperature relationships, it appears that the basic dependency 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 the 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.

VI. ACKNOWLEDGMENTS

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

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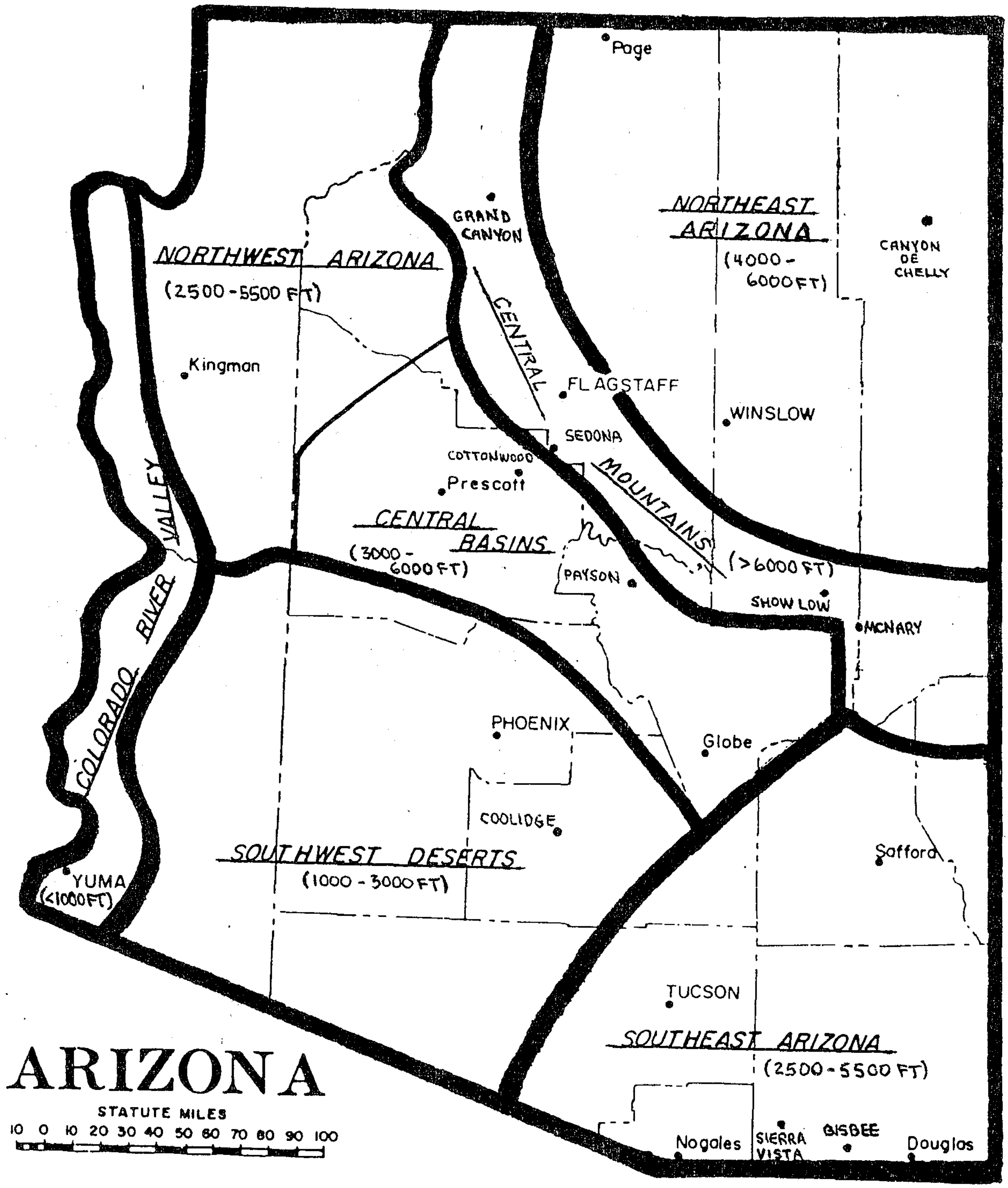
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GRAND CANYON
NORTHEAST ARIZONA
(4000-6000 FT)
CANYON DE CHELLY
NORTHWEST ARIZONA
(2500-5500 FT)
CENTRAL
Kingman
FLAGSTAFF
WINSLOW
SEDONA
COTTONWOOD
Prescott
MOUNTAINS
VALLEY
CENTRAL BASINS
(3000-6000 FT)
(>6000 FT)
PAYSON
SHOW LOW
MCNARY
COLORADO RIVER
PHOENIX
Globe
COOLIDGE
SOUTHWEST DESERTS
(1000-3000 FT)
Safford
YUMA
(<1000 FT)
TUCSON
SOUTHEAST ARIZONA
(2500-5500 FT)
ARIZONA
STATUTE MILES
10 0 10 20 30 40 50 60 70 80 90 100
Nogales
SIERRA VISTA
BISBEE
Douglas

FIGURE I

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)
ZONE STATION AND NUMBER	#1 COOLIDGE (COL)	#2 NOGALES (NOG)	#7 KINGMAN (IGM)	#12 GRAND CYN (GCN)	#15 CYN DE CHELLY (CNC)	
		#3 SIERRA VISTA (FHU)	#8 GLOBE (GLB)	#13 SHOW LOW (E03)	#16 PAGE (PGA)	
		#4 BISBEE (BIB)	#9 COTTON-WOOD (COT)	#14 MCNARY (MNY)		
		#5 DOUGLAS (DUG)	#10 SEDONA (SED)			
		#6 SAFFORD (E74)	#11 PAYSON (0E4)			

FIGURE 2

MONTHS-MARCH/APRIL   KEY STATION-INW

KEY STATION TEMP. RANGE	36-40	41-45	46-50	<--- TO --->	81-85
1972 CYN DE CHELLY	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 CYN DE CHELLY	45	46,46	48,47,47		77,73,77,76 77
PGA	45	48,48	50,54,50		75,78,79,79 78
1981 CYN DE CHELLY	44	46,46	48,47,48		79,81,81
PGA	46	48,49	50,52,54		73,78,76

FIGURE 3

KEY STATION AND SEASONAL PERIOD	INDIVIDUAL ZONE STATION AVERAGES OF STANDARD DEVIATION					ZONE AVERAGE OF STANDARD DEVIATION			
TUS	2-2.50	2.50-3	3-3.50	3.50-4	4-4.50	2.50-3	3-3.50	3.50-4	4-4.50
NOV - FEB			NOG/FHU DUG/E74		BIB		3.44		
MAR - APR		NOG/FHU DUG/E74	BIB			2.87			
MAY - JUN	FHU	NOG/DUG	BIB/E74			2.86			
JUL - AUG	NOG	FHU/BIB DUG/E74				2.71			
SEP - OCT		NOG	FHU/BIB DUG/E74				3.13		

KEY STATION AND SEASONAL PERIOD	INDIVIDUAL ZONE STATION AVERAGES OF STANDARD DEVIATION					ZONE AVERAGE OF STANDARD DEVIATION			
PRC	2-2.50	2.50-3	3-3.50	3.50-4	4-4.50	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	INDIVIDUAL ZONE STATION AVERAGES OF STANDARD DEVIATION					ZONE AVERAGE OF STANDARD DEVIATION			
FLG	2-2.50	2.50-3	3-3.50	3.50-4	4-4.50	2.50-3	3-3.50	3.50-4	4-4.50
NOV - FEB				GCN	E03/MNY				4.02
MAR - APR			GCN	E03/MNY				3.57	
MAY - JUN			GCN/E03	MNY			3.35		
JUL - AUG		GCN	E03/MNY				3.03		
SEP - OCT			GCN/E03	MNY			3.49		

KEY STATION AND SEASONAL PERIOD	INDIVIDUAL ZONE STATION AVERAGES OF STANDARD DEVIATION					ZONE AVERAGE OF STANDARD DEVIATION			
INW	2-2.50	2.50-3	3-3.50	3.50-4	4-4.50	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				3.20		
SEP - OCT			CNC	PGA			3.47		

FIGURE 4

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				

FIGURE 5

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							-2.00	- .59	+ .39	+ .97	+ .85	+ .78	+ .23	- .30	-1.05	-1.81	-2.68				
TUS		$\bar{X}$							36.00	42.41	48.39	53.97	58.85	63.78	68.23	72.70	76.95	81.19	85.32				
(NOV-	NOG	S							1.41	2.00	2.23	2.70	3.17	3.06	3.38	3.43	2.93	3.21	2.73				
FEB)		N							2	5	33	75	170	214	265	197	139	65	9				
		DEV							-7.46	-6.33	-4.90	-3.80	-4.22	-4.07	-4.00	-4.48	-5.11	-5.75	-7.67				
		$\bar{X}$							30.54	36.67	43.10	49.20	53.78	58.93	64.00	68.52	72.89	77.25	80.33				
	FHU	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				
		DEV							-8.33	-6.50	-5.33	-4.87	-5.31	-5.62	-6.08	-7.13	-7.73	-8.57	-10.55				
		$\bar{X}$							29.67	36.50	42.67	48.13	52.69	57.38	61.92	65.87	70.27	74.43	77.45				
	BIB	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				
		DEV							-5.34	-3.70	-2.44	-2.31	-2.37	-2.40	-2.84	-3.32	-4.14	-4.72	-6.56				
		$\bar{X}$							32.66	39.30	45.56	50.69	55.63	60.60	65.16	69.68	73.86	78.28	81.44				
	DUG	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				
		DEV							-3.10	-2.50	-2.39	-2.14	-2.95	-3.60	-4.62	-4.89	-5.05	-5.15	-5.21				
		$\bar{X}$							34.90	40.50	45.61	50.86	55.05	59.40	63.38	68.11	72.95	77.85	82.79				
	E74	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				
		DEV									+1.33	+ .36	+ .06	- .28	- .63	- .90	- .95	-1.66	-2.73	-4.30	-6.00		
TUS		$\bar{X}$									49.33	53.36	58.06	62.72	67.37	72.10	77.05	81.34	85.27	88.70	92.00		
(MAR-	NOG	S									1.21	3.11	3.22	3.11	2.99	3.18	2.58	2.86	2.46	2.41			
APR)		N									6	11	32	58	67	88	91	112	73	10	1		
		DEV									-3.33	-4.40	-4.22	-4.45	-4.91	-4.54	-4.54	-5.60	-6.70	-8.89	-12.00		
		$\bar{X}$									44.67	48.60	53.78	58.55	63.09	68.46	73.46	77.40	81.30	84.11	86.00		
	FHU	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		
		DEV									-4.20	-4.35	-4.34	-4.42	-5.43	-4.99	-5.91	-5.68	-7.54	-10.00	-15.00		
		$\bar{X}$									43.80	48.65	53.66	58.58	62.57	68.01	72.09	77.32	80.46	83.00	83.00		
	BIB	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		
		DEV									+ .47	-1.00	-1.31	- .95	-1.16	-1.58	-2.38	-3.09	-4.41	-7.10	-10.00		
		$\bar{X}$									48.47	52.00	56.69	62.05	66.84	71.42	75.62	79.91	83.59	85.90	88.00		
	DUG	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		
		DEV									- .50	-1.00	- .62	-1.03	-1.37	-1.60	-1.88	-1.90	-1.93	-3.40	-6.00		
		$\bar{X}$									47.50	52.00	57.38	61.97	66.63	71.40	76.12	81.10	86.07	89.60	92.00		
	E74	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		
		DEV													+ .17	- .56	-1.81	-3.23	-3.73	-4.17	-4.35	-4.13	-3.95
TUS		$\bar{X}$													68.17	72.44	76.19	79.77	84.27	88.83	93.65	98.87	104.05
(MAY-	NOG	S													5.12	2.81	3.89	3.16	2.73	2.76	2.47	2.37	1.97
JUN)		N													6	13	25	60	129	133	106	115	41
		DEV													-2.15	-3.25	-4.30	-5.64	-6.85	-6.84	-7.21	-7.22	-6.97
		$\bar{X}$													65.85	69.75	73.70	77.36	81.15	86.16	90.79	95.78	101.03
	FHU	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
		DEV													-2.83	-2.77	-4.47	-6.24	-7.00	-7.63	-8.01	-7.84	-7.63
		$\bar{X}$													65.57	70.23	73.53	76.76	81.00	85.37	89.99	95.16	100.37
	BIB	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
		DEV													+ .67	0.00	-1.21	-2.61	-4.08	-4.65	-4.53	-4.75	-4.50
		$\bar{X}$													68.67	73.00	76.79	80.39	83.92	88.35	93.47	98.25	103.50
	DUG	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
		DEV													+1.33	+ .77	- .24	- .59	- .74	- .74	- .92	- .95	- .87
		$\bar{X}$													69.33	73.77	77.76	82.41	87.26	92.26	97.08	102.05	107.13
	E74	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

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		X̄																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
		X̄																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
		X̄																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
		X̄																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
		X̄																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		X̄										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	
		X̄										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	
		X̄										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	
		X̄										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	
		X̄										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	

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				+7.67	+7.05	+6.48	+5.94	+5.25	+4.66	+3.61	+3.07	+2.49	+1.90	+1.33	+ .75						
PRC		X̄				30.67	35.05	39.48	43.94	48.25	52.66	56.61	61.07	65.49	69.90	74.33	78.75						
(NOV–	IGM	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						
FEB)		N				3	4	27	87	132	168	233	218	174	93	46	16						
		DEV				+10.50	+9.95	+9.39	+8.87	+8.14	+7.01	+5.58	+4.16	+3.23	+1.93	+1.10	+ .48						
		X̄				33.50	37.95	42.39	46.87	51.14	55.01	58.58	62.16	66.23	69.93	74.10	78.48						
	GLB	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						
		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						
		X̄				34.00	38.05	42.00	47.38	51.86	56.03	59.99	64.37	68.82	72.81	76.65	81.00						
	COT	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						
		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						
		X̄				28.33	33.25	37.95	42.87	47.43	51.97	56.47	61.09	65.86	70.47	75.13	79.53						
	SED	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						
		DEV				+7.67	+5.75	+3.93	+3.54	+3.20	+2.77	+2.07	+1.41	+ .84	– .17	–1.00	–1.55						
		X̄				30.67	33.75	36.93	41.54	46.20	50.77	55.07	59.41	63.84	67.83	72.00	76.45						
	OE4	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						
		DEV						+7.40	+6.54	+5.82	+5.36	+4.87	+4.96	+4.52	+4.92	+5.02	+5.12	+5.00					
PRC		X̄						40.40	44.54	48.82	53.36	57.87	62.96	67.52	72.92	78.02	83.12	88.00					
(MAR–	IGM	S						3.29	3.07	3.81	3.62	3.86	2.94	3.03	2.84	2.79	2.57						
APR)		N						5	14	43	61	61	84	81	93	86	25	1					
		DEV						+9.20	+9.15	+9.53	+9.93	+9.63	+9.57	+9.77	+8.99	+8.00	+7.14	+5.00					
		X̄						42.20	47.15	52.53	57.93	62.63	67.57	72.77	76.99	81.00	85.14	88.00					
	GLB	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					
		DEV						+10.00	+9.50	+9.71	+10.18	+9.93	+10.16	+10.26	+9.78	+9.69	+8.50	+7.00					
		X̄						43.00	47.50	52.71	58.18	62.93	68.16	73.26	77.78	82.69	86.50	90.00					
	COT	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					
		DEV						+5.80	+5.75	+5.57	+5.80	+6.17	+6.51	+6.63	+6.68	+7.09	+6.05						
		X̄						38.80	43.75	48.57	53.80	59.17	64.51	69.63	74.68	80.09	84.05						
	SED	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						
		DEV						+3.00	+2.79	+3.19	+3.41	+3.28	+3.69	+4.00	+3.83	+3.48	+2.08	+0.00					
		X̄						36.00	40.79	46.19	51.41	56.28	61.69	67.00	71.83	76.48	80.08	83.00					
	OE4	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						
		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	
PRC		X̄									56.20	60.71	66.13	70.81	76.26	80.83	85.72	90.28	95.12	99.62	104.26	109.00	
(MAY–	IGM	S									2.59	3.55	3.93	3.77	3.56	2.91	2.51	2.45	2.80	2.07	1.74		
JUN)		N									5	7	15	33	58	100	128	120	92	53	27	1	
		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	
		X̄									61.99	66.47	70.87	75.32	79.80	84.20	88.57	92.69	97.16	101.56	105.52	111.00	
	GLB	S									5.12	3.08	4.73	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	
		DEV									+12.50	+11.67	+11.50	+11.61	+11.59	+11.34	+11.06	+11.00	+11.49	+11.17	+9.88		
		X̄									60.50	64.67	69.50	74.61	79.59	84.34	89.06	94.00	99.49	104.17	107.88		
	COT	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		
		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	
		X̄									56.75	61.64	66.62	71.59	76.86	81.95	86.80	91.56	96.91	101.76	106.27	108.00	
	SED	S									3.86	2.91	3.99	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	
		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	
		X̄									53.60	59.00	63.60	68.73	73.74	78.27	82.89	87.39	92.21	96.74	101.37	105.00	
	OE4	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	

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			$\bar{X}$														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		
			$\bar{X}$														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		
			$\bar{X}$														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		
			$\bar{X}$														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		
			$\bar{X}$														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			$\bar{X}$								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			
			$\bar{X}$								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			
			$\bar{X}$								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			
			$\bar{X}$								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			
			$\bar{X}$								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			

DATA TABLE 2 (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							
		MCN	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							
		MCN	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			
		MCN	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	3.45	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		
		MCN	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				
		MCN	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				

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–		CDC	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–		CDC	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–		CDC	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–		CDC	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–		CDC	S									3.23	2.59	3.46	3.03	3.31	3.37	3.10	2.96	2.99	3.03	1.82		
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	2.63	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		

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