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THE EFFECT OF AIR-MASS CONVECTIVE RAINFALL ON SUMMER MAXIMUM TEMPERATURES ALONG THE NORTHERN GULF COAST

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AARON WILLIAMS, JR.

Norman, Oklahoma

1971

THE EFFECT OF AIR-MASS CONVECTIVE RAINFALL ON SUMMER MAXIMUM TEMPERATURES ALONG THE NORTHERN GULF COAST

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INTRODUCTION

The thunderstorm's ability to transfer a tranquil summer afternoon into a display of awesome power has long stimulated inquiry into its physical processes and climatological characteristics. Early in this century most of the thunderstorm studies were essentially of a climatological nature and, as in the case of Alexander (1), included many noteworthy contributions that are still cited today. Although basically climatological, studies by Brooks (6), Douglas (12), McAuliffe (19), and Thornthwaite (29) indicated a trend toward the analysis of small areas and an investigation of the physical processes.

Two government reports, however, appear to have established the present trend in thunderstorm research. In 1945 the U.S. Weather Bureau Hydrometeorological Section, acting upon a request from the U.S. Army Corps of Engineers, compiled a comprehensive report concerning thunderstorm rainfall in the United States, the most significant climatological study of its type to date (30). Shortly thereafter, the U.S. Weather Bureau's Thunderstorm Project was initiated and subsequently produced the first intensive and documented study of the physical processes of the thunderstorm (7). This project unquestionably was responsible for the lack of thunderstorm climatological studies and the trend toward physical investigation which is still underway 23 years later.

Since the Thunderstorm Project, research concerning convective rainfall has been oriented toward the creation of a realistic model of a convective storm (28). Enhanced by computerization and sophisticated radar detection equipment, man has gained considerable insight into the physical processes involved in developing, maintaining, and dissipating the convective cell. [1]

Few published studies have appeared in recent years pertaining to the climatology of air-mass

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[1]The convective cell is an organized unit of the atmosphere with upward motion at its center and downward motion along its perimeter. A single thunderstorm may consist of several cells.

convective activity.[2] Studies such as those of Carson (9) and Day (11) have primarily dealt with the effect of various meteorological parameters, such as convergence, divergence, and absolute humidity, on cell distribution. Recently, attempts have been made to correlate these and other parameters with cell patterns from radar imagery (14)(21). Unfortunately, detailed studies of the effects of air-mass convective rainfall on other climatic parameters and their distribution have been neglected.

With recent research efforts primarily centered over southern Florida, other areas with a high frequency of air-mass convective rainfall have received a minimum of attention. One area, the northern Gulf Coast, has one of the highest annual and seasonal frequencies of thunderstorm days in the United States. Mostly of the air-mass type, thunderstorms annually occur on more than 60 days along and south of a line connecting Lake Arthur, Louisiana; Jackson, Mississippi;

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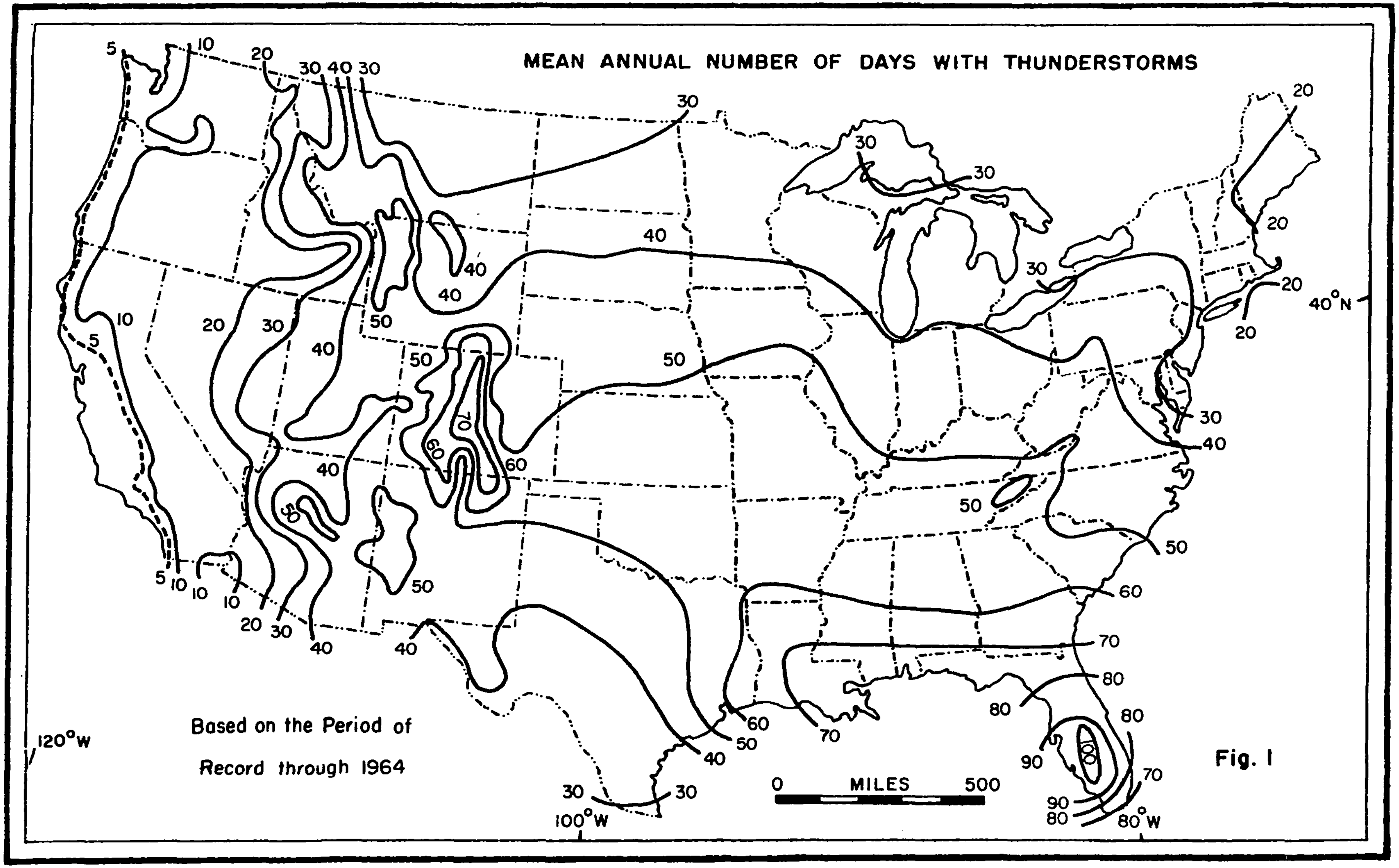
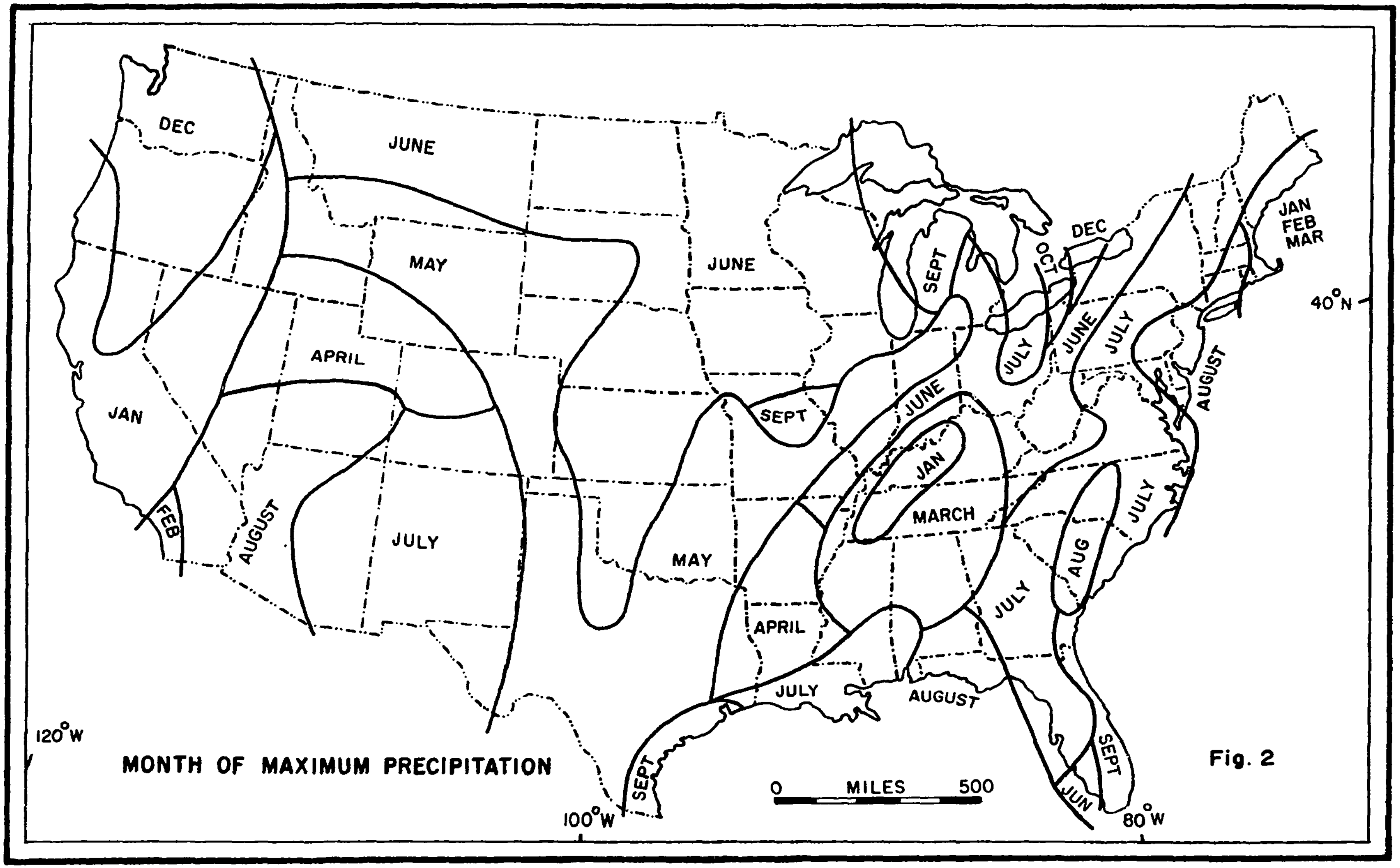
[2]Air-mass convective activity refers not only to thunderstorms, but to convectively produced showers and cloud cover.

Bainbridge, Georgia; and Tallahassee, Florida (Fig. 1). This high frequency of convective activity is surpassed only by the Florida peninsula which has a much longer season during which air-mass showers occur. Whereas tropical maritime air rather persistently covers the Florida peninsula from the spring through the fall, warm, moist conditions prevail over the northern Gulf Coast from June through August. During this shorter period the atmosphere is nearly homogeneous for exogeneous air-masses lie well to the north of the region. Outside of an occasional tropical disturbance air-mass convective rainfall is the major climatological phenomena during the summer season. The abundance of rainfall during this time, particularly in July, is enough to overcome a spring maximum which is dominant over the northern part of the region and the lower Mississippi and Tennessee River Valleys (Fig. 2).

Thus the combination of a homogeneous atmosphere, a high frequency of air-mass showers, and a summer rainfall maximum makes the northern Gulf Coast an excellent location for a study of air-mass convective rainfall.



SOURCE: NATIONAL WEATHER SERVICE



MONTH OF MAXIMUM PRECIPITATION

Fig. 2

SOURCE: HYDROMETEOROLOGICAL REPORT NO. 5, U.S. WEATHER BUREAU

PART I

PROBLEM STATEMENT AND METHODOLOGY

CHAPTER I

STATEMENT OF PROBLEM AND HYPOTHESES

In spite of the homogeneous atmosphere along the northern Gulf Coast, there are significant variations in selected climatological variables in the area. One is in the distribution of maximum temperatures. A map of mean July maximum temperatures of 90° to 92° are typical within 50 miles of the coast (Fig. 3). At greater distances, however, the maximums exceed 93°. The sub-90° readings adjacent to the coastline are undoubtedly a result of the cooling effect of the Gulf of Mexico. The lower readings in the interior, however, are related to a different set of climatic variables. It is hypothesized that one such variable is convective rainfall. Therefore, the problem of this research study is to answer the question, "What is the relationship between air-mass convective rainfall and the distribution of summer maximum temperatures along the northern Gulf Coast?"

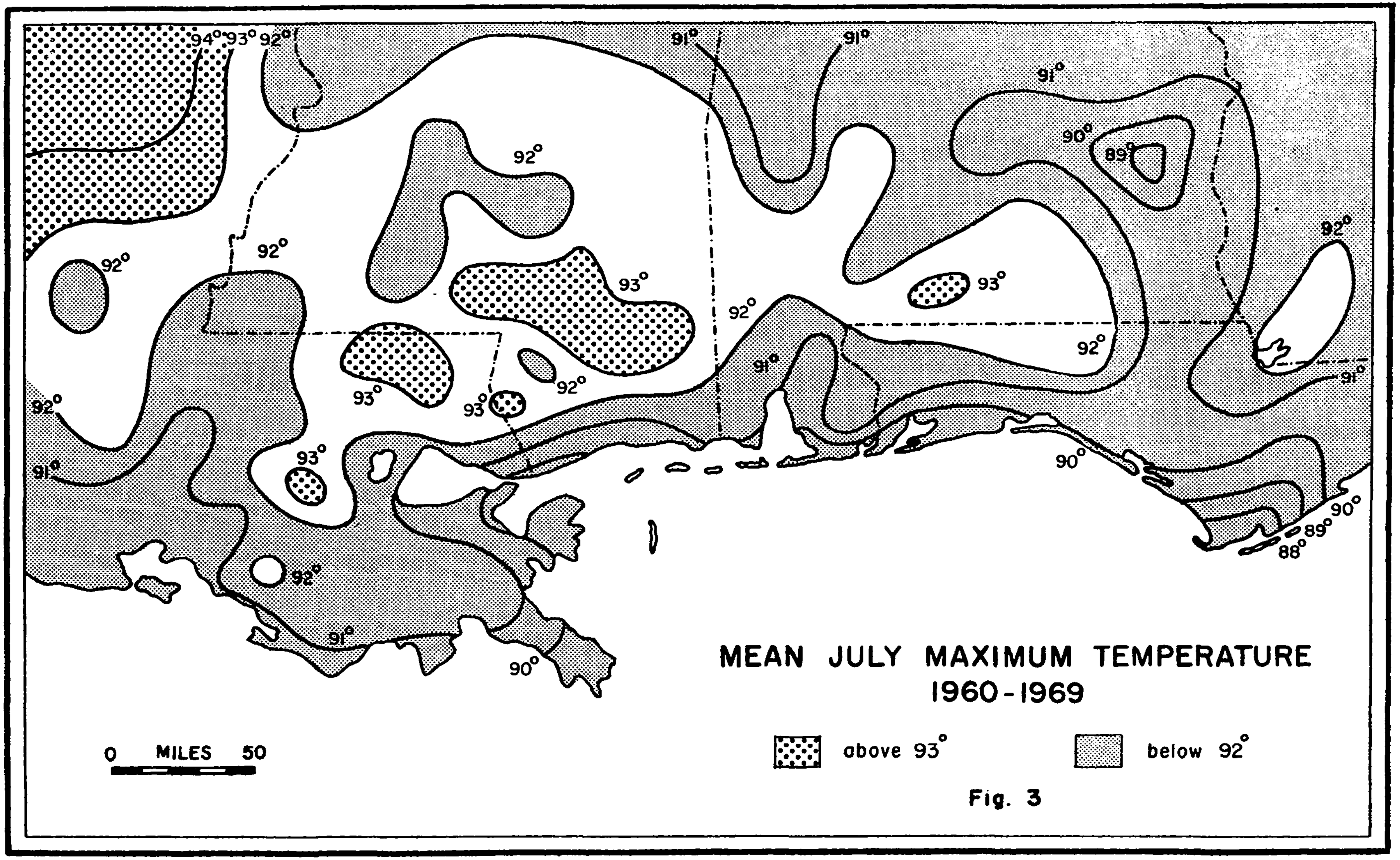


Fig. 3

SOURCE: CLIMATOLOGICAL DATA

Research Hypotheses

Based on both theoretical and empirical considerations it is hypothesized that there exists a significant relationship between convective rainfall and the distribution of mean July maximum temperatures.

This research hypothesis will be examined by testing the following supportive hypotheses.

I. There exists a significant inverse relationship between the amount of air-mass convective rainfall and maximum temperatures.

II. The hour of occurrence of air-mass convective rainfall has a significant effect on daily maximum temperatures.

III. The hour of occurrence of air-mass convective rainfall has a significant effect on the mean July maximum temperature.

If either hypothesis I or III is accepted, sufficient evidence exists supporting the research hypothesis. Hypothesis I is independent, whereas hypothesis III is dependent on hypothesis II not being rejected. The acceptance of hypothesis II does not imply that the hour of occurrence has an effect on the mean July maximum temperature for there are numerous days in the month which are non-convective. Thus, hypothesis III will be tested to determine if the hour of occurrence produces low daily maximum temperatures of sufficient frequency to affect the mean July maximum despite the inclusion of non-convective days.

Rationale

The research hypothesis is based on the association between convective rainfall cells and (1) the surface over which they form and (2) the cooling characteristics inherent to all convective cells.

Two surfaces strongly influence the spatial patterns of air-mass convective rainfall along the northern Gulf Coast. These are (1) the vast level to gently rolling Gulf Coastal Plain and (2) the waters of the Gulf of Mexico with its numerous bays, inlets, and tidal flats. Since surface heating is considerable stronger over land during the day, convective rainfall cells are usually more intense and numerous than those over coastal waters. Towering cumulus, the forerunners of rainfall cells, usually develop during the late morning hours when the lapse rate becomes sufficiently steep to initiate vertical motion. According to Chalker (10), the lapse rate in moist air need not be much greater than the moist adiabatic lapse rate to trigger air-mass showers. He concludes that relative humidity, in addition to surface heating, is a prime factor in controlling convective showers. Once vertical motion commences in the moisture-laden air, cell development is rapid. The greatest frequency of cells occurs in the early afternoon, the time of maximum temperatures. This high frequency of afternoon showers is illustrated by the coastal plain cities of Meridan and Vicksburg, Mississippi (Table 1). Both have approximately two-thirds of their summer total between noon and 6 p.m. Closer to the coast showers are more numerous during the late morning because of the sea breeze (Table 1). This preponderance of morning thunderstorms along the

TABLE 1
SUMMER FREQUENCY OF THE OCCURRENCE OF THUNDERSTORMS
(Percentage)

Station	Time in E. S. T.			
	00-06	06-12	12-18	18-24
Inland				
Meridian	3.3	11.8	69.4	15.4
Vicksburg	7.7	11.3	63.1	17.9
Coast				
New Orleans	4.1	28.2	58.6	9.1
Pensacola	12.1	26.3	49.2	12.4

Source: U. S. Weather Bureau, Hydrometeorological Section, Thunderstorm Rainfall

TABLE 2
SUMMER FREQUENCY OF THE OCCURRENCE OF THUNDERSTORMS
(Percentage)

Station	Time in E. S. T.			
	00-06	06-12	12-18	18-24
Inland				
Meridian	1.4	4.8	28.4	6.3
Vicksburg	3.1	4.6	25.5	7.2
Coast				
New Orleans	2.0	13.6	28.2	4.4
Pensacola	7.4	16.1	30.1	7.6

Source: U.S. Weather Bureau, Hydrometeorological Section, Thunderstorm Rainfall coast is clearly shown by the frequency and probability data for New Orleans and Pensacola (Table 1 and 2). For the coast, the probability is approximately one chance in six, while inland it is reduced to one in twenty.

During the night convective activity is mainly confined to the warm coastal waters where the lapse rate is conducive to cell development. Steepened by more rapid cooling aloft than at the surface, the lapse rate permits vertical motion and subsequent cell development through the night hours and often past daybreak. However, the vertical contrast in temperature is not as great as that experienced inland during the daylight hours and thus cells are not as intense. Nevertheless, cells occasionally produce early morning downpours. Once heating begins along the coast, the upper atmosphere warms, the lapse rate stabilizes, and nocturnal shower activity dissipates. Nocturnal thunderstorms are not infrequent inland but compared to the frequency over coastal waters and the interior of the United States their frequency is insignificant (Fig. 4).

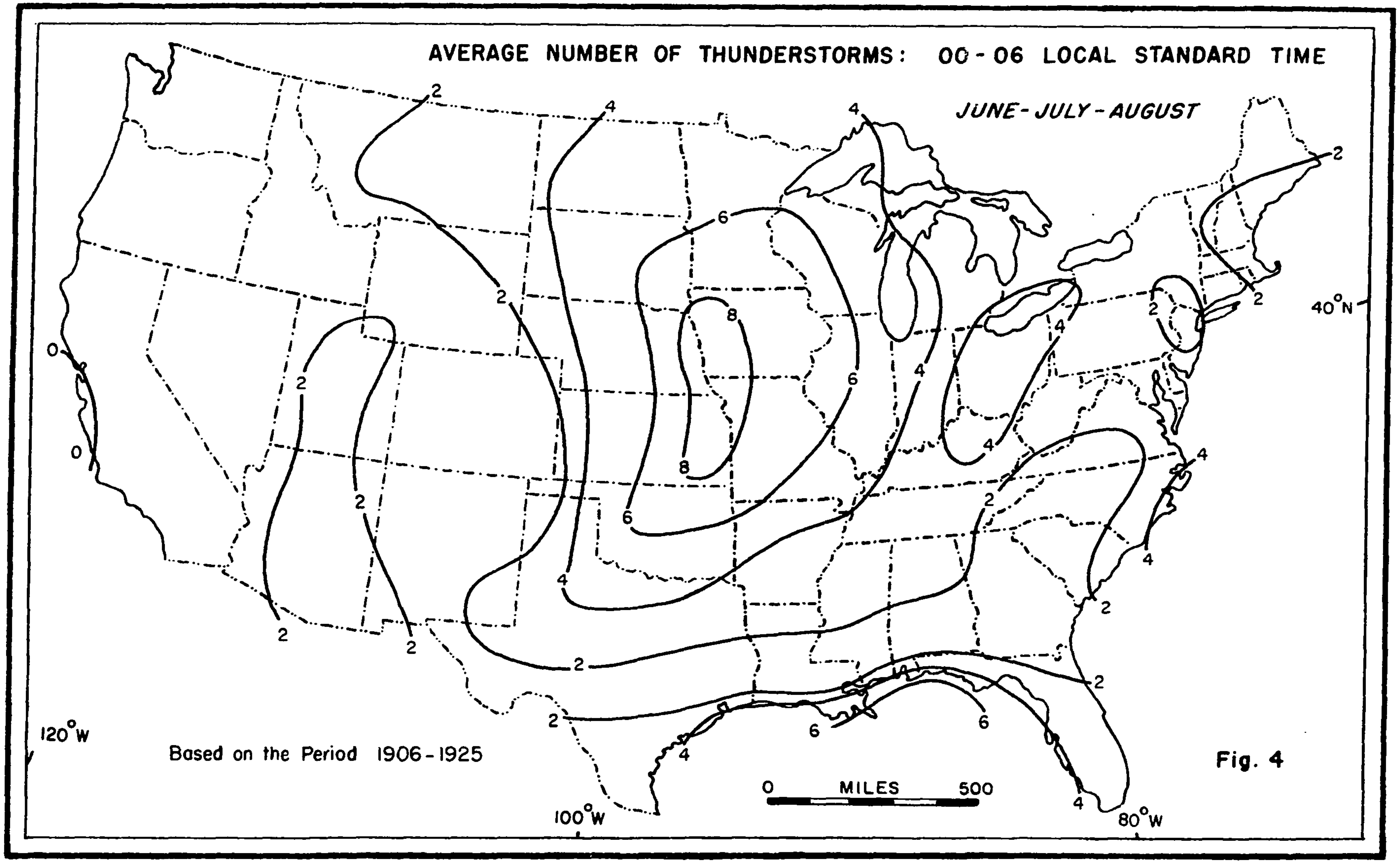
Cooling Effects of Convective Showers

Each convective cell, whether inland or over water, may lower the maximum temperature in three ways: (1) by inducing varying amounts of rainfall, (2) by its extensive cloud shield, and (3) by a downdraft.

Amount of Rainfall

The variability in rainfall amounts is a salient characteristic of convective rainfall (13). Rainfall amounts may be markedly different from cells of similar areal size because volume is primarily a function of the strength and duration of cells. This difference is due to the vertical rather than the horizontal development of the cell. A storm that achieves a maximum elevation of 40,000 feet will release more energy and endure longer than one that is only 25,000 feet in height.

Rainfall amounts from storms of different height have a varying effect on the maximum temperature. Although air-mass showers are usually of short duration with rapid clearing, the effects of an excessive day-



SOURCE: HYDROMETEOROLOGICAL REPORT NO. 5, U. S. WEATHER BUREAU time rainfall, such as standing water and saturated soil, remain long after the storm has passed. As a consequence, the ground is unable to heat the atmosphere as rapidly as before the storm since a considerable amount of heat is used in evaporation. In this case, maximum temperatures will be low and may possibly be the readings established prior to the onset of the storm. A light rainfall, in contrast, will evaporate rapidly, the ground will heat, and subsequently more energy is transferred to the atmosphere from the surface. As a result, maximum temperatures are seldom affected.

Cloud Cover

The cloud cover associated with a convective storm frequently reaches outward from the cell for great distances. This cover serves as an effective shield against incoming solar radiation. Cloud coverage may be prominent at two levels. Near the surface, where turbulence is a factor, air converging into the cell often produces spectacular cumuliform clouds which encircle the parent cloud, the cumulonimbus. At high altitudes, the crystallization of moisture in diverging air produces cirrus clouds that are promptly carried downwind in strong upper air currents. This vast semi-transparent shield creates the characteristic anvil shape of mature thunderstorms. Although the sun's rays can penetrate through them to the earth's surface, cirrus clouds may reflect as much as 35 to 40 per cent of the incoming solar radiation (15). The effect of thunderstorms and convective clouds of all sizes on long term incoming solar radiation is shown in Figure 5 where the July weekly totals in New Orleans are lower than those of June (31).

Downdraft

The convective downdraft is a significant contributor to surface cooling. Induced by precipitation, it forms from cold air at high altitudes within the cell, subsides, and emerges from the base of the cell whereupon it surges for a considerable distance in the direction of the storm path. The leading edge of this cold air-mass is recognizable by low clouds, often in the form of a roll or arch cloud. Between the arch cloud and the rainfall is a "cloud-free vault" within which there is a much higher cloud ceiling due to the buildup of a cold dome of air beneath it (27). This cold dome may extend to 10 miles in diameter and disrupt temperature and wind patterns over a 100 mile wide region (4). Depending on the storm's direction of movement, an observing station may be enveloped by the downdraft and arch cloud but fail to record any precipitation. Consequently there may be no climatological record indicating the close proximity to an air-mass shower. Only through the pictorial or observational record of weather radar can nearby cells be documented.

The Occurrence of Convective Rainfall

Whenever air-mass convective rainfall occurs it is marked by cooling from rainfall, cloud cover, and downdrafts. The combined effect of these three components may be called the "cooling power" of the cell. When combined they can be represented as unity by the "rainfall occurrence. Thus an

WEEKLY MEAN VALUES OF DAILY TOTAL SOLAR AND SKY RADIATION AT NEW ORLEANS, LOUISIANA

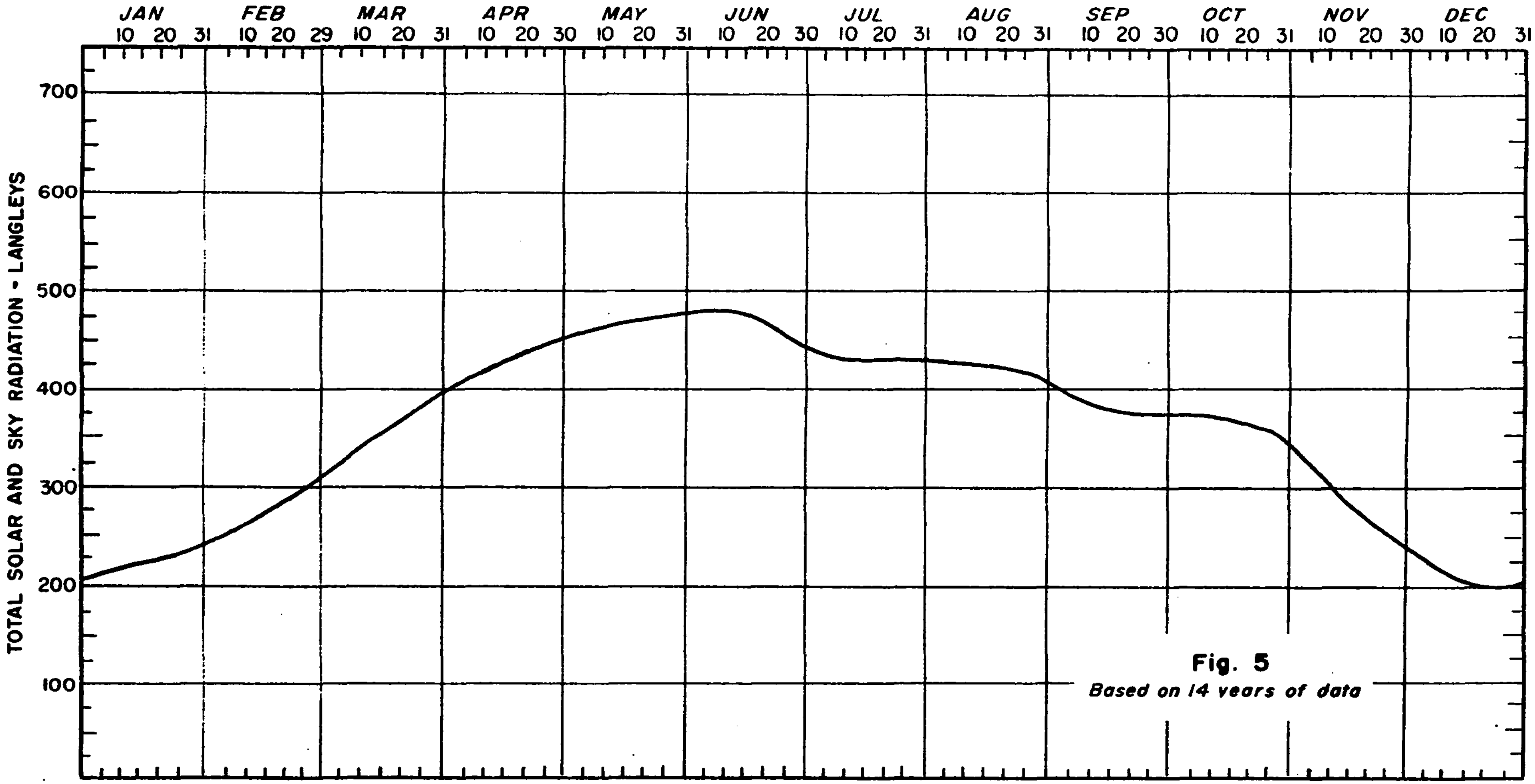


Fig. 5
Based on 14 years of data

SOURCE: U. S. WEATHER BUREAU TECHNICAL REPORT NO. 11 occurrence simply represents the existence of a convective cell without any consideration of the amount of precipitation from that cell. It is hypothesized that the occurrence of convective rainfall should more accurately measure the effect of convective rainfall on maximum temperatures for: (1) the occurrence represents a summation of cooling factors, and (2) as a numerical unit value it is not subject to the variation inherent in rainfall amounts.

Radar Detection of Convective Rainfall

The existence of moisture in a raingauge, regardless of the amount, is the best indicator of the occurrence of a convective shower providing the cell has spawned precipitation. Without a measurable rainfall amount, the documentation of the effects of a distant shower may be virtually impossible using standard climatological records. Only the occurrence of a trace, an amount too small to measure, furnishes some evidence of the effects of a storm in the vicinity of a station. Also it is possible that the trace occurs because of a shower in the formative or dissipating stage.

Radar, however, is able to detect rainfall at distances in excess of 200 miles. It provides valuable information on the areal size, height, intensity, direction and rate of movement of the storm cell. With this data, the effect of cloud cover and the downdraft may be determined from corresponding data in the climatological record.

Since World War II radar has been widely used for meteorological purposes. In research, it has become an effective tool in determining the structure of severe storms, particularly thunderstorms. As a forecasting device it is a trustworthy warning system for both tornadoes and hurricanes.

Climatologically, a major use of radar has been the detection and determination of the amount of rainfall from echoes on the radar screen. The importance of radar in studying precipitation was brought to attention by Riggs and Truppi (26) in the following:

> It appears that the measurement of precipitation is among the least representative of

> our conventional observations. Precipitation is evidently more variable in time and space than any other meteorological phenomenon of general economic significance. The development during the past several years of the use of radar in the study of weather has made available to meteorologists a new means of attacking problems of climatology, fundamental to the solution of which is the obtaining of accurate observations of precipitation.

As a result of research by the Illinois State Water Survey (26) and individual studies such as that by Wilson (33), rainfall may be measured by analyzing the intensity of echoes from the PPI.[3] Using this technique, it is possible to estimate the amount of precipitation that has fallen over remote areas where raingauges are not deployed, thus adding considerable accuracy to flood forecasts.

With the development of a national system of radar units by the National Weather Service, studies have begun to appear concerning the climatology of the geographical area surrounding these installations. Richards (25) provided an early study of the frequency

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[3] PPI is an abbreviation for plan-position indicator scope. On this type of radar scope, the range and azimuth of a cell are displayed in polar coordinates.

of cells in various quadrants of the radar scope, and his work has been followed by numerous studies utilizing the National Weather Service WSR-57 radars. In South Carolina, research on the distribution of cells at Charleston by Parrish and Lopez (23), and the radar climatology of the state by Landers (18), have contributed to a long overdue series of local and regional surveys. On the national scale, Kantor and Grantham (16) have provided considerable work on high altitude echoes and their distribution. With a grid pattern such as that developed by Kessler and Russo (17), extracted radar data may be assembled for use in electronic computers.

On the basis of its successful application to climatological problems, it is felt that radar best measures the occurrence of convective rainfall. Thus, the data from radar should produce a more significant relationship between convective rainfall and maximum temperatures than that occurring with other precipitation variables. By being able to determine rainfall at varying distances, the total effect of convective rainfall on the maximum temperature, or the combined effect of all variables, will be approached. Thus, by combining radar data with tests utilizing precipitation a more accurate examination of the research hypothesis is possible.

Inland Occurrences

The timing as well as the number of occurrences has an important effect on maximum temperatures. For this reason the temporal aspect of convective rainfall will be analyzed. Based on the cooling element of convective rainfall, it is hypothesized that the period of occurrence will have an important impact on the maximum temperature of that day.

For inland areas rainfall occurring after 1 or 2 p.m., the time of maximum temperature, should have little effect on the daily maximum temperature (2). The exception is if an extremely thick and extensive layer of cirrus precedes the storm.

Rainfall occurring during the late morning hours should disrupt the normal rise and produce cooling sufficient enough to prevent the temperature from achieving a high maximum once the storm has passed (Fig. 6). Even though the temperature may "rebound" at a rate similar to the pre-storm heating period, it should still be short of the expected maximum. On the other hand, convective rainfall occurring during the early morning hours should have less of an effect on the daily maximum temperature as the air has adequate time to establish a normal rate of increase (Fig. 7). This is because the cooling produced by an early shower does not lower the temperature much below the temperature normal for that time of day. Therefore, once clearing occurs and surface moisture is evaporated, the temperature assumes a normal rate of increase.

Coastal Occurrences

The early morning occurrence of rainfall should have a greater effect on the maximum temperature along the coastline than inland. This is a function of the sea breeze which curtails the rise in temperature around noon. Showers during the early morning hours delay this rise in temperature so that when the

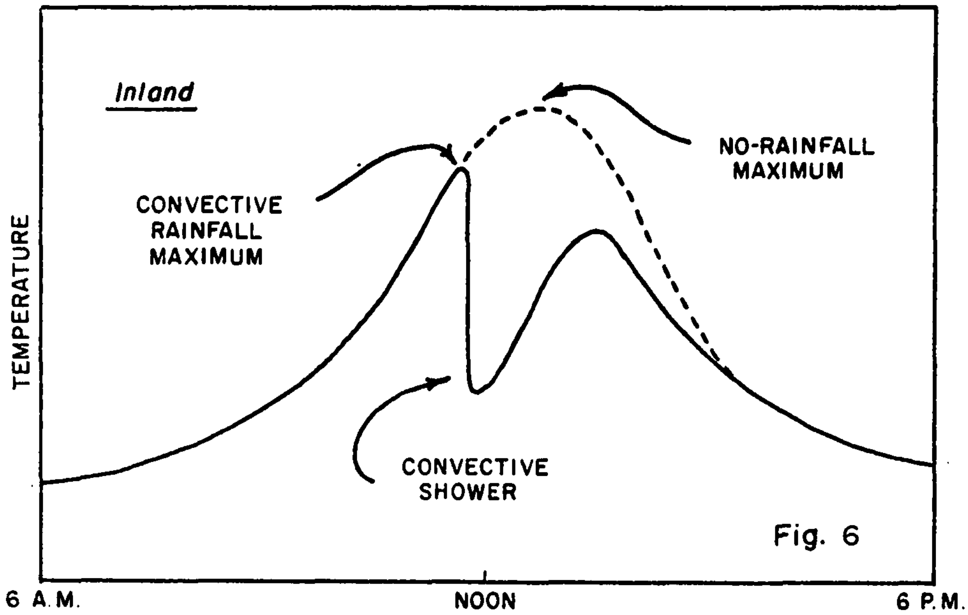


Fig. 6

LOW MAXIMUM TEMPERATURE PRODUCED BY LATE MORNING CONVECTIVE RAINFALL

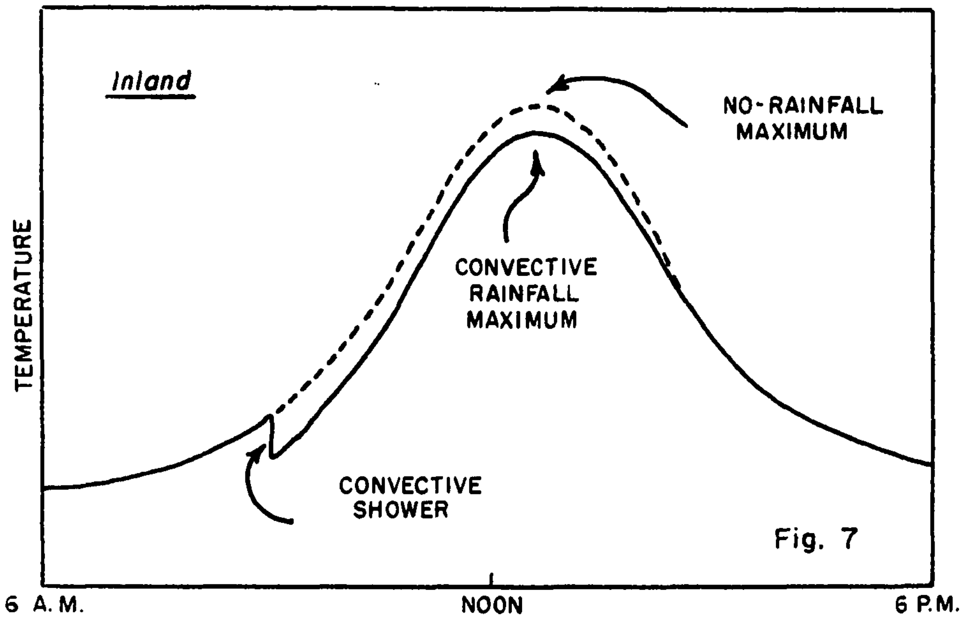


Fig. 7

LOW MAXIMUM TEMPERATURE PRODUCED BY EARLY MORNING CONVECTIVE RAINFALL sea breeze takes effect, the temperature should not have had sufficient time to reach the expected maximum temperature at the time the sea breeze normally commences (Fig. 8). If rainfall occurs late in the morning, the maximum temperature should not be too different from that expected on days without rainfall. In this instance, the temperature will have had the entire morning to approach the expected maximum and the occurrence of rainfall will have a minimal effect (Fig. 9). Thus it is hypothesized that early morning convective rainfall has the greatest significant effect on lowering maximum temperatures along the immediate coastline. Conversely, in the inland areas, the late morning hours should be the most significant.

The procedures for obtaining occurrences, amounts, and the location of distant convective rainfall cells, as well as the methodology involved in testing for a relationship between convective rainfall and maximum temperatures, will be examined in the following chapter.

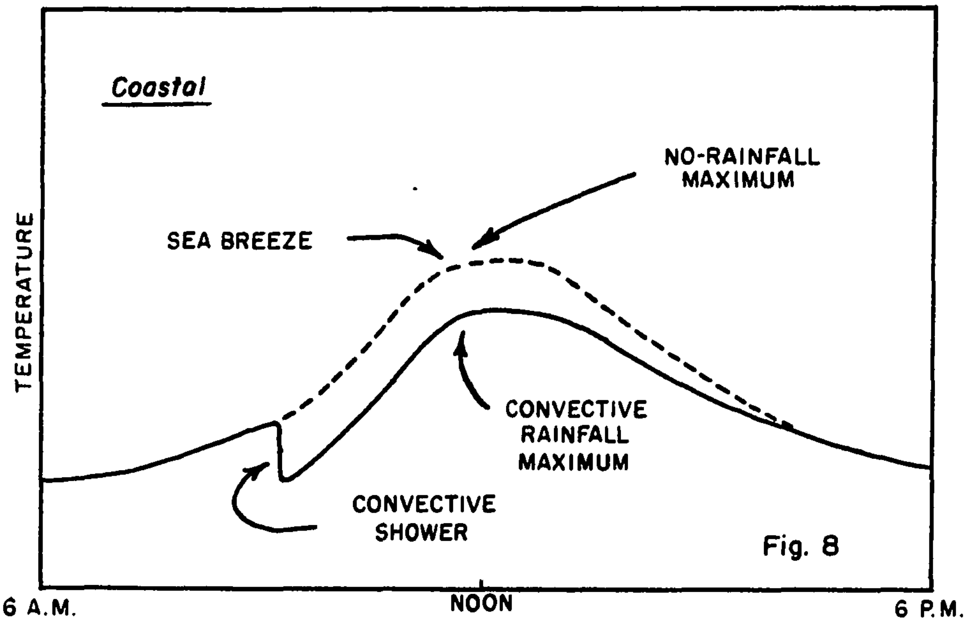


Fig. 8

LOW MAXIMUM TEMPERATURE PRODUCED BY EARLY MORNING CONVECTIVE RAINFALL

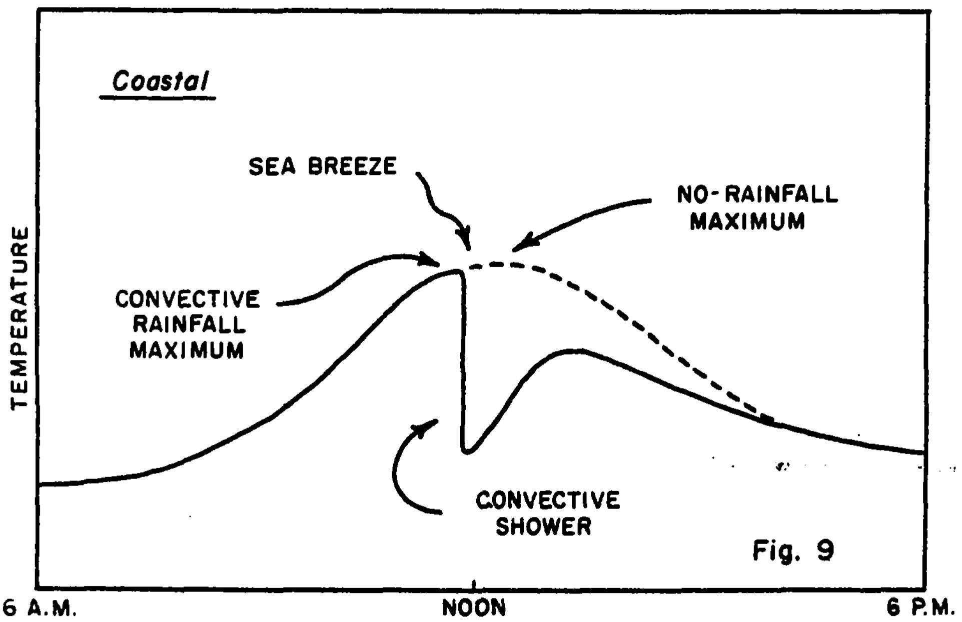


Fig. 9

LOW MAXIMUM TEMPERATURE PRODUCED BY LATE MORNING CONVECTIVE RAINFALL

CHAPTER II

METHODOLOGY

The methodology consisted of two important steps: (1) the selection of samples and (2) the design of statistical tests. Samples were chosen from climatological records and radar imagery and subsequently placed in a statistical framework to determine the association between convective rainfall and maximum temperatures.

Sample Selection

Three factors were critical to the selection of samples. These were: (1) the determination of a period of study that was both conducive to convective rainfall and of sufficient length to make averages and test results more meaningful, (2) the establishment of those days which had tropical air mass conditions so that convective rainfall could be distinquished in climatological records, and (3) the inclusion of as many stations as possible so as to provide a widespread sampling of the region.

Period of Study

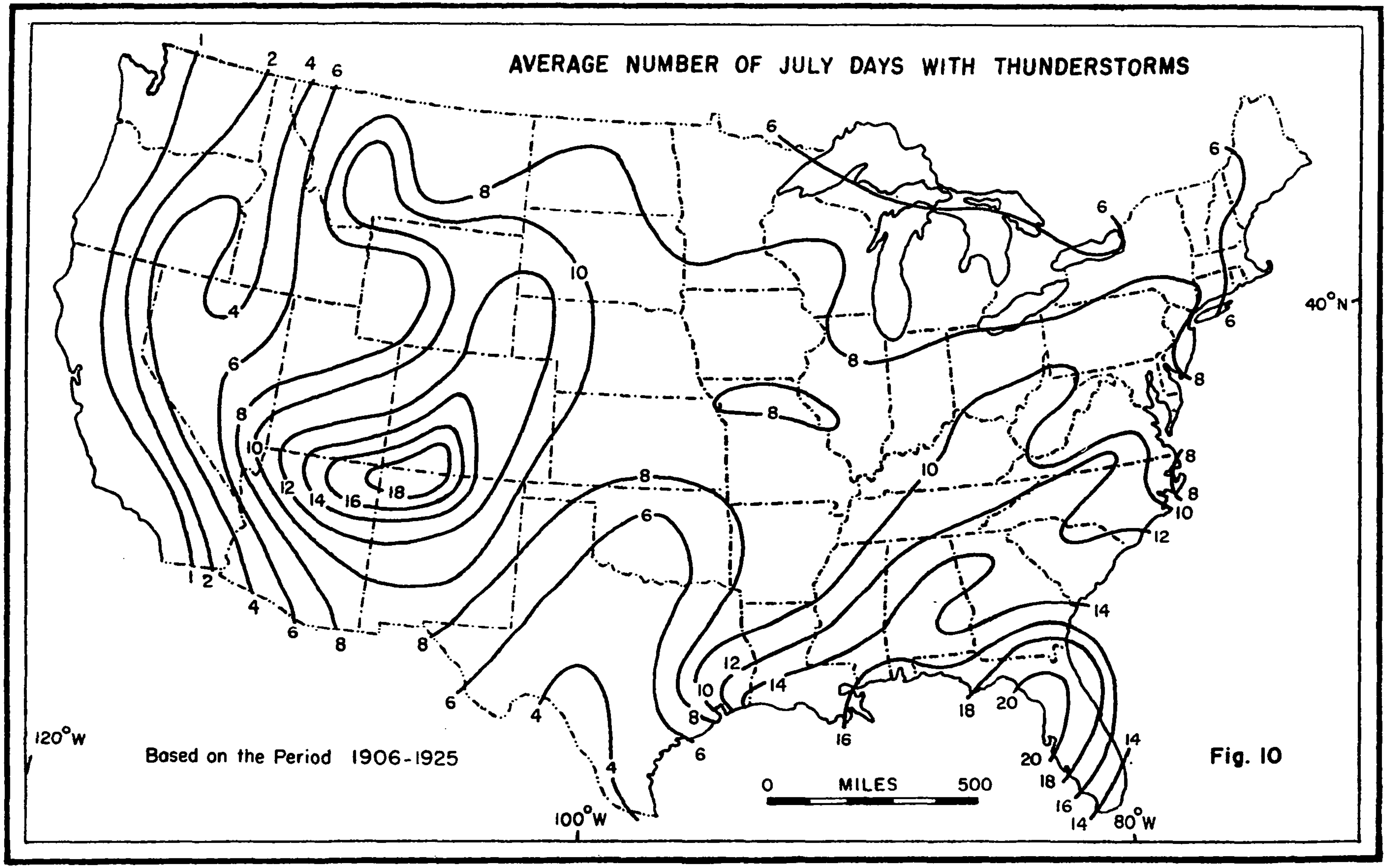
Although tropical maritime air and convective activity persist throughout the summer months, July has the greatest degree of atmospheric homogeneity and the maximum frequency of thunderstorms. Approximately one half of the July days have thunderstorms, with a maximum along the Mississippi and Alabama coast and the eastern Florida panhandle (Fig. 10). In general, thunderstorm days decrease in all directions from these areas except eastward.

Frontal passage is rather infrequent during July, for at that time the jet stream is weak and has a more northerly position. From its high latitudinal location the jet stream prevents polar air masses from pushing far south by directing them across the northeastern states to the Atlantic Ocean. When frontal passage occurs in the Gulf States, the invading polar air-mass is so greatly modified from its traverse of the continental land mass that it provides only a minimal temperature change and a slight decrease in humidity. The convergence of moisture-laden air from the south and slightly drier air from the north often results in widespread thunderstorm activity or prefrontal squall lines, even though there is little temperature contrast across the front.

In addition to an occasional change brought about by an exogeneous air-mass, tropical disturbances in the form of hurricanes, tropical storms, or easterly waves cross the Gulf of Mexico and disrupt the normal July convective pattern over the northern Gulf Coast. They occur during every summer month, but in July they are weaker and less numerous.

Therefore, on the basis of its maximum frequency of thunderstorm days and the persistence of a nearly homogeneous atmosphere, July was selected as the month for determining the effect of air-mass showers on the maximum temperature.

To reduce the effect of anomalous years and at the same time make it possible to achieve levels of significance in the various statistical tests, it was desirable to select a study period of sufficient length. Also pertinent to the selection was the fact



SOURCE: HYDROMETEOROLOGICAL REPORT NO. 5, U. S. WEATHER BUREAU that many cooperative stations either came into existence or became sufficiently equipped only between World War II and the beginning of the last decade. Therefore, a ten-year period (1960-1969)was chosen during which the amount, occurrence, time, and distribution of convective rainfall for each July were examined.

Determination of Air-Mass Convective Rainfall

Air-Mass Rainfall

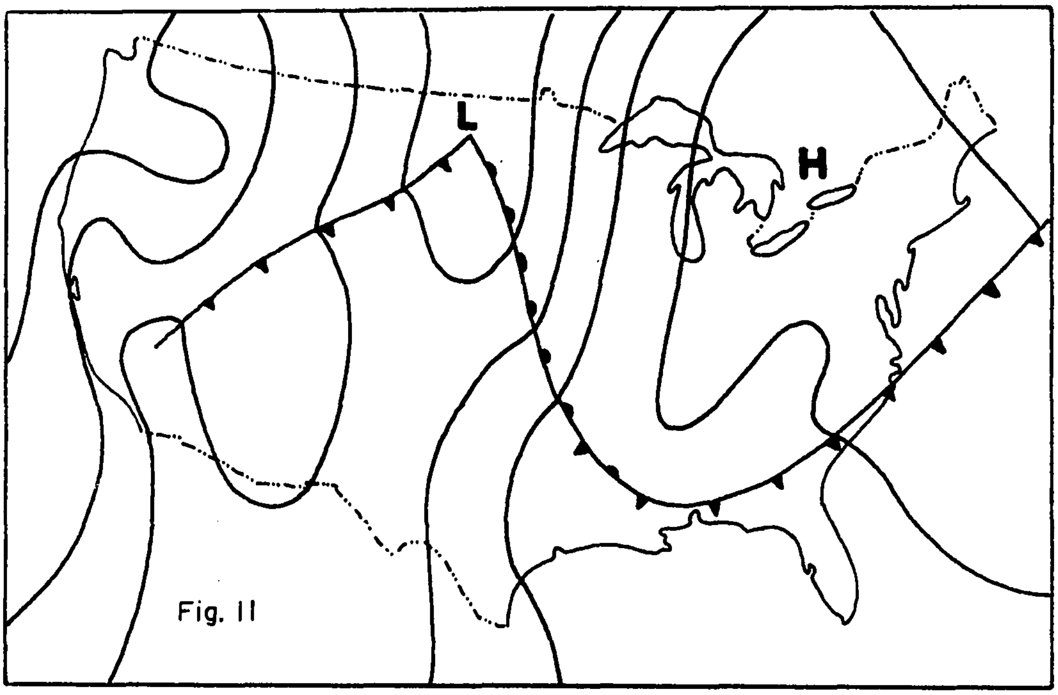
To analyze air-mass convective activity, it was essential to eliminate those days when frontal, tropical disturbance, or polar air-mass conditions occurred. Weather maps for the ten July months and those days in which non-air-mass activity was present or adjacent to the study area were excluded (Appendix I). The remaining days, herein referred to as convective days, were used in the analysis even if rainfall failed to occur over the entire region.

Non-Air-Mass Rainfall

Most non-air-mass situations are clearly indicated on daily weather charts. However, in some instances, little evidence is found on the surface weather map. The approach of a front over the northern Gulf states noticeably affects the circulation pattern and may result in the lineation of cells into a squall line (Fig. 11). A weak front passing over the coastal plain, however, frequently stalls over the warm coastal waters. Even though moisture and temperature contrasts are insignificant, a weak pressure trough becomes imbedded in the low level isobaric surfaces creating a wide area of convergence (Fig. 12). A minor triggering mechanism of this type, identifiable only by map continuity and a slight bend in the isobars, is all that is necessary to produce a high density of shower activity and cloud cover during times when such activity is normally scattered or absent.

Tropical disturbances, even in a dissipating stage, may cover the region with numerous thunderstorms, such that many stations may record rain during the majority of hours of a calendar day. This is an abnormal pattern since air-mass showers

FRONT IN THE STUDY AREA: A NON-CONVECTIVE DAY



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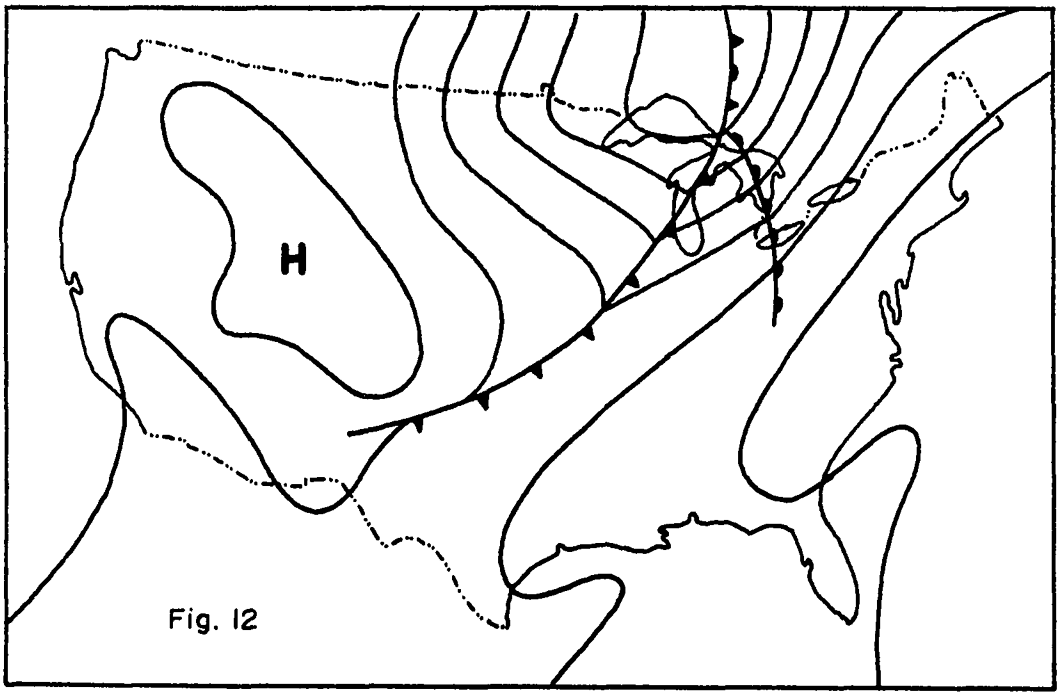
WEAK FRONTAL TROUGH IN THE STUDY AREA: A NON-CONVECTIVE DAY



are usually of short duration. During the ten-year period of investigation tropical storms did not affect the study area, although easterly waves traversed the region several times (Fig. 13). Rainfall from easterly waves, as well as fronts, was considered non-convective and therefore omitted from the study.

Detection of Air-Mass Rainfall by Radar

Radar has the distinct advantage of detecting air-mass convective rainfall at a considerable distance. Using standard climatological records, the conventional method, cells can only be identified if they produce rainfall at an observing station.

During the last decade, National Weather Service radar units were equipped with motion picture cameras to document severe weather activity. Thus, the size, distribution, and general behavior of cells have been recorded in considerable detail at many locations across the country.

Film records have been kept at two locations within the study area, New Orleans and Apalachicola. The reels at both of those stations were reviewed

EASTERLY WAVE IN THE STUDY AREA: A NON-CONVECTIVE DAY

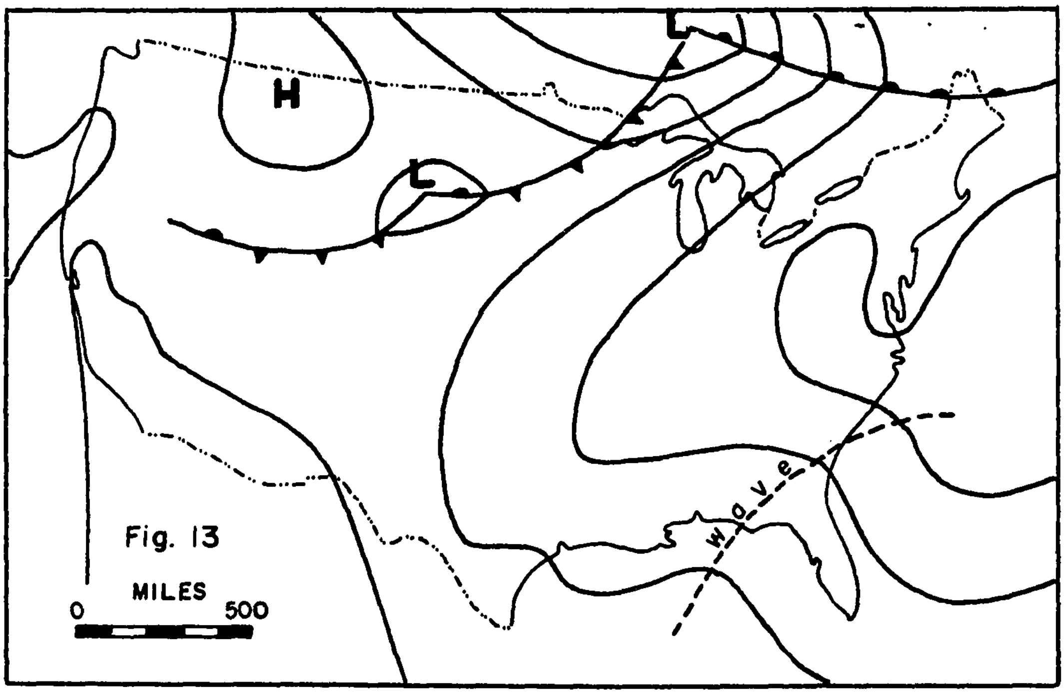


Fig. 13

and one month, July 1965, was selected for study.[4]

Extraction of Data

An examination of each individual frame was necessary to extract the data. This was done by projecting each picture on a National Weather Service radar chart at intervals of two hours, from 10 a.m. to 2 p.m., and plotting the center of each cell. National Weather Service radar observations for New Orleans, Mobile, and Apalachicola were checked as an aid in the delineation of cells. These records did not indicate every cell, but rather the coordinates of triangular or rectangular areas in which cells were found.

Problems Incurred

In determining the full extent and intensity of convective activity, radar produces more than its share of problems. Equipment failure, ground clutter, obstructions, atmospheric refraction, and

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[4]July 1965 was selected primarily on the basis of having a minimum of disruption due to camera and radar malfunction.

the curvature of the earth all reduce the effectiveness of radar, and adjustments are required before the data become meaningful.

Many problems were inherent in the radar and therefore necessitated an awareness of their appearance on the PPI scope. One of these, ground clutter, forced the omission of large areas of the PPI so as not to generate extremely large errors. According to Battan, "almost all PPI pictures from ground based radar sets show some echoes from the ground at very short ranges (3)." Ground clutter occurred because emitted power, even in very small amounts, was returned to the WSR-57 receiver after having reflected off objects such as buildings and towers. Although the radar beam was directed between objects, small amounts of power were radiated over a wide angle thus reflecting nearby objects.

The WSR-57 radar unit at New Orleans produces an enormous area of ground clutter, and consequently there is a major problem in detecting and extracting convective cells. Ground clutter is so extensive that it is extremely difficult to determine the location of cells within a 40-mile radius of the radar. The unit, located on the roof of the Federal Building in downtown New Orleans, is encircled by ground clutter which radiates outward along major highways, the Mississippi River, and Lake Ponchartrain. The outline of Lake Ponchartrain may be seen in Figure 14 as an eye-shaped area slightly north of the center of the scope bisected by a white line, the reflection of the 23-mile long Lake Ponchartrain Bridge.

Obstructions may reduce the signal return to near zero for the entire 250-mile range of the WSR-57 radar. In New Orleans, where several large downtown buildings stand taller than the radar installation, one structure alone produces a hugh swath through southeast Mississippi and south central Alabama (Fig. 14). To the east, the International Trade Center reduces a signal return from low cells over the Gulf of Mexico east of Chandaleur Island. There is no more effective barrier than on the southeast where the 50-story Plaza Tower completely blocks all returns across the delta and the Gulf of Mexico.

Frequently much of southern Mississippi and the northern shore of Lake Ponchartrain are seen on the PPI as a result of the formation of a "duct." When an inversion occurs, the radar beam is refracted to the earth resulting in the return of the earth's surface to the PPI. Figure 15 shows the result of a duct on the PPI at Apalachicola. The entire surface of the triangular peninsula from west of Panama City, Florida to areas east of St. Marks, Florida appears white. Often resembling cells strung along the coast of Mississippi, Alabama, and Florida, the off-shore islands conspicuously appear on the PPI scope when an inversion is present. Thus, in attempting to delineate cells it was necessary to recognize and omit these situations.

Although the WSR-57 has a maximum range of 250 miles, its effectiveness rapidly diminishes beyond 140 miles. Since under normal atmospheric conditions the radar beam follows a nearly straight path above the curving earth, convective rainfall at great distances does not reflect the beam as it passes into space. This decline in effectiveness is shown in Figure 16 where the elevation angle (0.0 line) requires an increasingly higher cell with increasing distance from the radar. At distances approaching the maximum range only those cells of exceptional height will return a signal. The chance of towering cells occurring along the northern Gulf Coast is small anyway. This can be seen in Figures 17, 18, and 19 where the probability of cells returning an echo decreases rapidly with increasing elevation.

Selection of Stations

Type of Data

The study area consists of twenty-five observing stations chosen on the basis of (1) the recording of both maximum temperatures and hourly precipitation, and (2) the completeness of the record. While observing stations are numerous in the region, only a

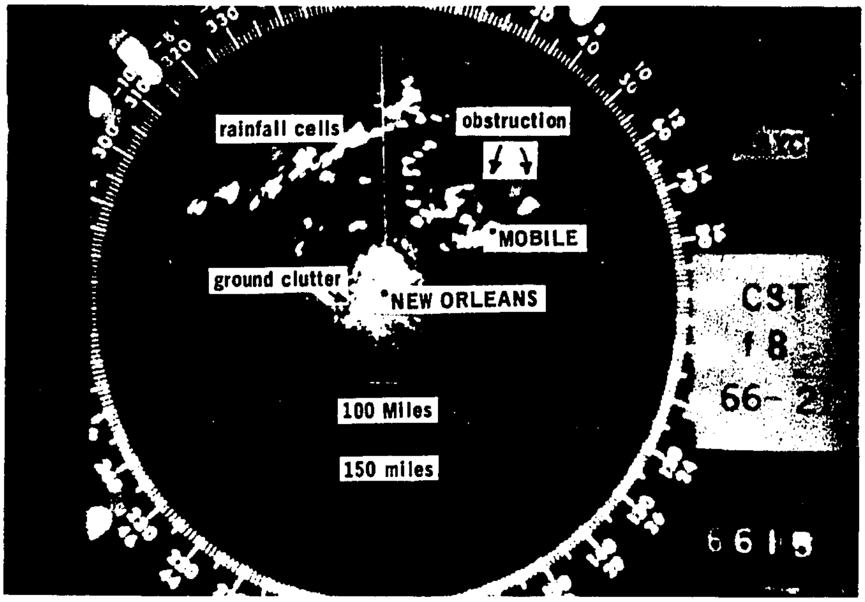


Fig. 14. New Orleans PPI scope, July 12, 1966, 15:56 CST.

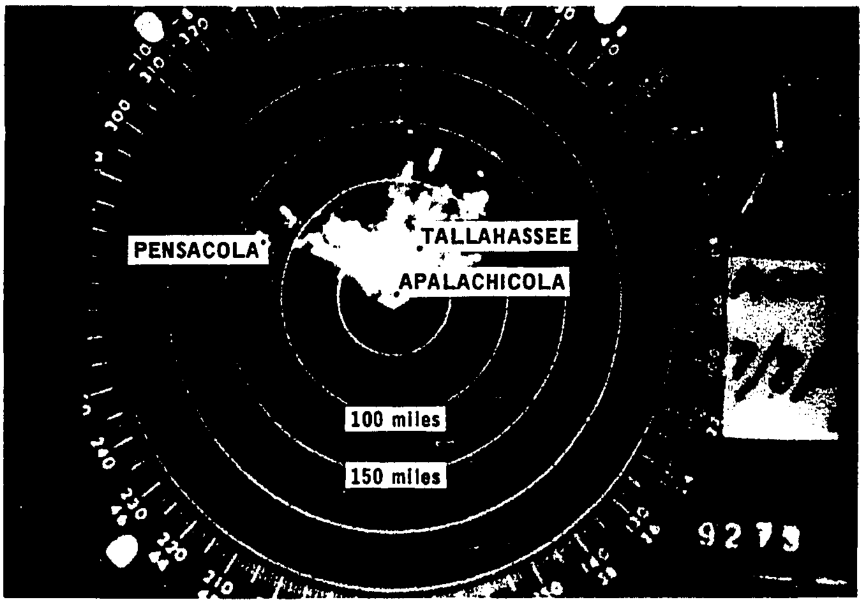


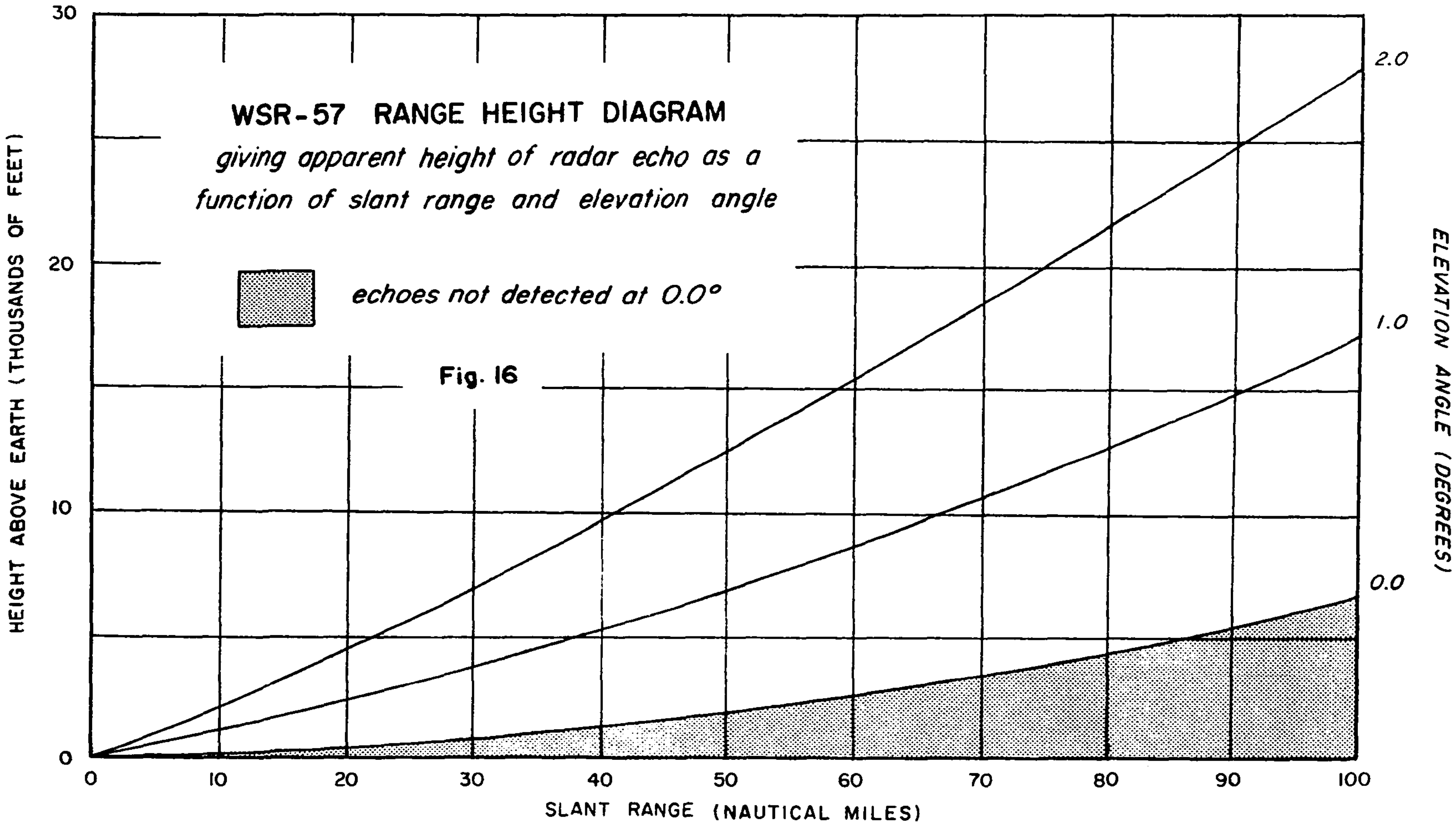
Fig. 15. Apalachicola PPI scope, July 8, 1966, 11:35 EST.

small portion of the total number meet the criteria established for inclusion in the sample. Most observing stations record the daily maximum temperature, and a large number measure precipitation. However, few document the hour of rainfall, for hourly rainfall requires an automatic raingauge, an item of considerable expense. Of the properly equipped stations in the study area, nine are National Weather Service first-order stations and the remainder are cooperative (Fig. 20). First-order weather stations are of prime importance for they accurately record the hour of occurrence of trace rainfall.

Trace Rainfall

The trace is a significant element of convective rainfall for it provides a situation in which the effects of a rainfall cell that "just missed" a recording station may be measured. As put by W. F. McDonald: (20)

> While from a purely practical point of view, concerned with interference with outdoor work, transportation, sales, etc., the hours with measurable rain are admittedly the principal end of study, there is a great interest, from the meteorological point of view, in including



SOURCE: WEATHER RADAR MANUAL PART B, NATIONAL WEATHER SERVICE

PROBABILITY (%) OF PRECIPITATION ECHOES AT 35-40,000 FEET, JULY

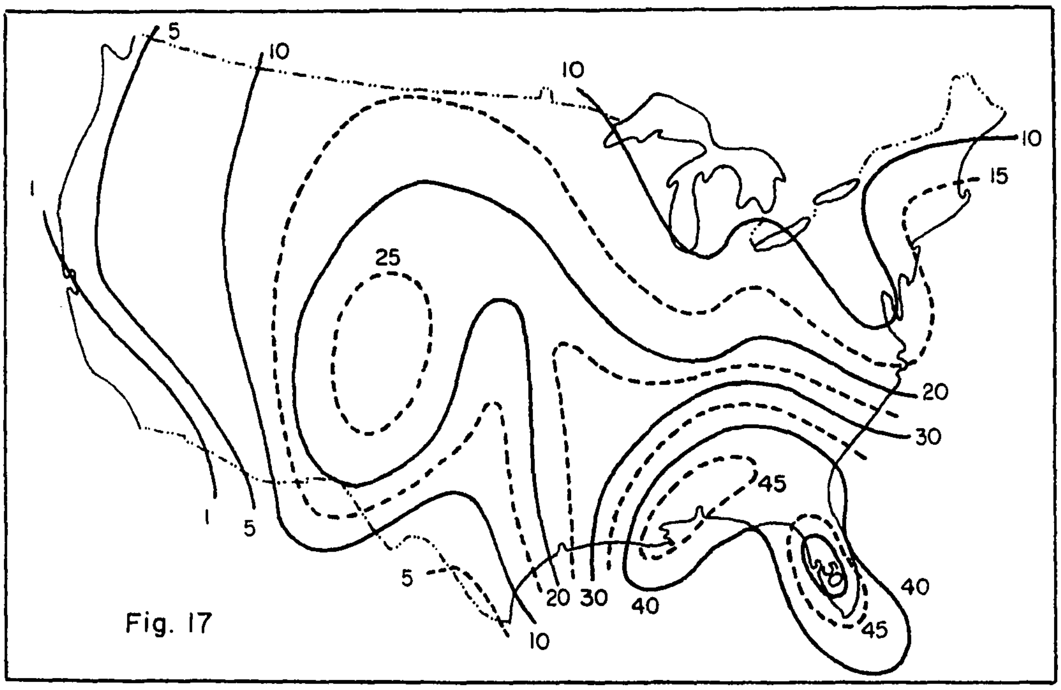


Fig. 17

MILES
0 500

PROBABILITY (%) OF PRECIPITATION ECHOES AT 45-50,000 FEET, JULY

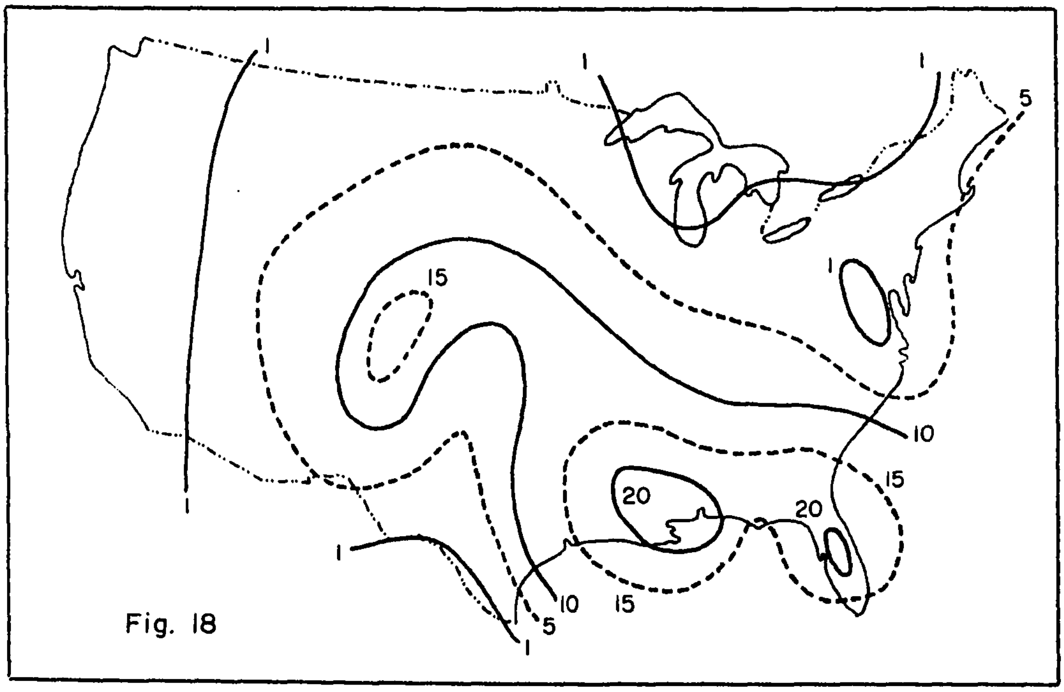


Fig. 18

SOURCE: KANTOR, A. J. AND GRANTHAM, D. D. AIR FORCE SURVEY IN GEOPHYSICS NO. 191

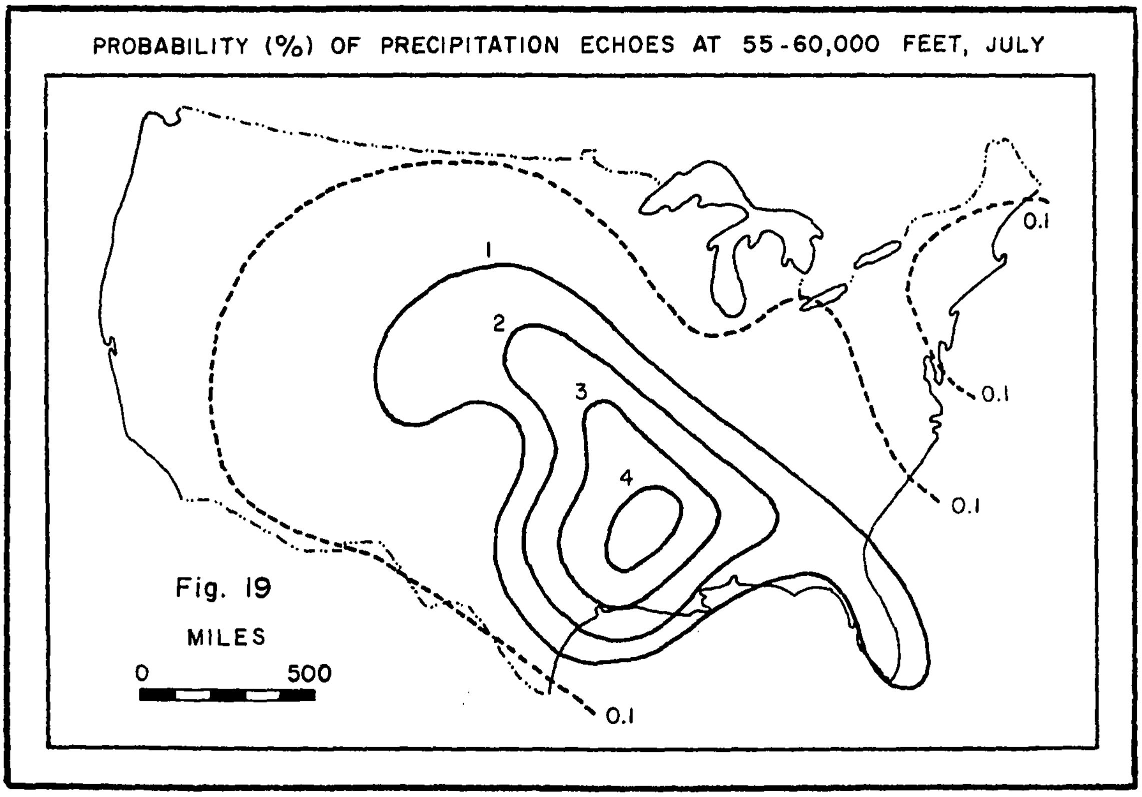


Fig. 19

SOURCE: KANTOR, A. J. AND GRANTHAM, D. D. AIR FORCE SURVEY IN GEOPHYSICS NO. 191

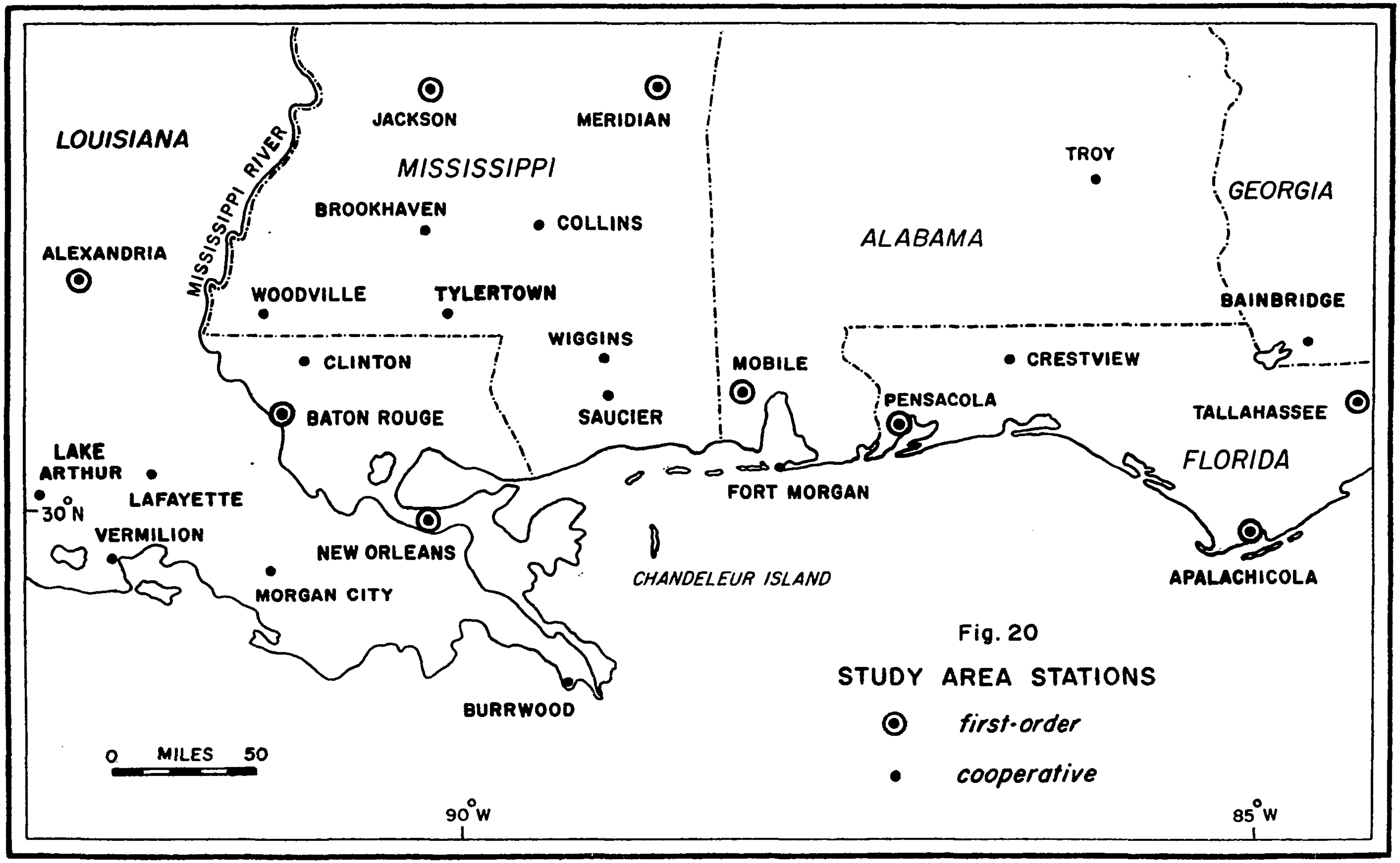


Fig. 20

STUDY AREA STATIONS

> also the hours with any rainfall whatever; that is, hours in which only traces of rain are recorded. The fact that precipitation even in insignificant amount is occurring, is important as showing the existence of that combination of circumstances which may be briefly designated as the "rain condition." In summer especially traces often actually represent the occurrence of measurable and at times of heavy showers in the near vicinity, but showers of such limited compass that only the outer edge of the rainfall area affects the recording station.

Traces account for a large part of the total rainfall occurrences at many stations. In coastal areas, particularly during the morning, showers are numerous and generally less intense than those which develop inland. Hence, a large number of traces results. In New Orleans, traces outnumber measurable occurrences during the hours immediately following sunrise (Table 3) (20). It must be pointed out, however, that traces are less likely to be observed at night and may account for the significant increase around sunrise. Nevertheless, the trace is frequent at all hours and therefore is definitely a major characteristic of convective rainfall statistics.

TABLE 3

TOTAL NUMBER OF HOURS WITH RAIN AT NEW ORLEANS, LA.
JULY 1898-1927

Data	Hours ending												
	A.M.							P.M.					
	5	6	7	8	9	10	11	12	1	2	3	4	5
Trace	12	23	35	34	28	48	47	75	97	70	73	64	52
.01" or more	29	31	34	32	48	54	82	104	124	126	114	108	77

Source: W. F. McDonald (20)

Both first-order and cooperative stations record trace rainfall, but the accuracy of its determination depends on the observer. Since automatic raingauges do not record traces, the observer is left with the responsibility for its documentation. First-order stations are continuously manned, and thus in all probability the occurrence of a trace will be noticed. This is not the case at cooperative stations where the observer often depends on his chance observation of a trace, or where he may note the approximate period during which he believed a trace occurred. Thus the use of traces in this study is confined to the first-order stations for which traces are published and the records are known to be accurate.

Completeness of Record

The length of record was a major factor in the selection of stations. Although ten years was chosen for the period of study, it was necessary to accept several stations with less than ten years of record in order to have a sufficient number for statistical testing. An acceptance level of eight years was established and, as a result, stations such as Biloxi, Mississippi and Panama City, Florida with only six years of record were excluded. The omission of stations due to incomplete records, as well as failure to meet the data requirements, produced an unequal distribution of stations over the study region. Coverage was concentrated in southern Mississippi and the Mississippi River delta, to the neglect of areas like southern Alabama. Unfortunately, the uneven distribution could not be avoided since it was advantageous to have the maximum number of stations meeting the criteria.

Statistical Design

Amount of Convective Rainfall and the Maximum Temperature

Since the amount is the most readily available and commonly used rainfall statistic, it was the first precipitation variable to be used in testing for a relationship between convective rainfall and maximum temperatures. Because convective rainfall is usually of short duration, it was necessary to test the amount using several time periods.

HYPOTHESIS: There is a significant inverse relationship between the amount of convective rainfall and maximum temperatures.

The null hypothesis was tested using the Pearson correlation to determine the degree of the relationship between (1) monthly total convective rainfall and the daily maximum temperature, (2) total daily convective rainfall and the daily maximum temperature, (3) total monthly convective rainfall for each hour and the mean July maximum temperature, and (4) each hourly rainfall amount and the maximum temperature for that day.

The end result of testing, the coefficient of correlation (r), indicates the magnitude or degree to which the amount of convective rainfall and the maximum temperature vary together, and the direction, positive or negative (32). The coefficient of correlation, however, is not a measurement scale but only an index.

To compare two or more relationships the coefficient of determination (r^2) was calculated. This value represents the percentage variation in the dependent variable (maximum temperature) that was explained by the variation in the independent variable, here the amount of rainfall. The more the variation in the maximum temperature explained by the amount of rainfall, the greater the relationship between variables. Each correlation was tested at the 95 per cent level of significance.

Total July convective rainfall and the mean July maximum temperature were first analyzed. Each July rainfall total was determined by summing all hourly rainfall amounts for convective days between

8 a.m. and 4 p.m. since these hours are likely to have some effect on the maximum temperature (Appendix II). Rainfall totals were then correlated with the mean July maximum temperature.

Daily convective rainfall totals were correlated with the daily maximum temperatures for first-order stations in order to establish the relationship between individual convective rainfall days and the maximum temperature (Appendix III). As in the previous test, only convective totals between 8 a.m. and 4 p.m. were included in the daily total.

In the previous two tests, rainfall amounts were totalled for the eight-hour period without regard to whether these amounts preceded or followed the time of the maximum temperature. By correlating the amount of rainfall for each hour with the maximum temperature for that day, the importance of rainfall amounts before and after the time of the maximum temperature was determined (Appendix IV). Two stations were chosen for the test, one inland and one on the coast.

Then, for the ten-year period of record of the first-order stations, rainfall amounts for each hour were totalled for the month. Subsequently, the ten July totals for each hour were correlated with the mean July maximum temperatures for the same period (Appendix V).

Hour of Occurrence of Convective Rainfall and the Daily Maximum Temperature

When a thunderstorm is in close proximity to an observing station during the daylight hours, its cloud cover and cooling downdraft may produce a low maximum temperature that is comparable to conditions prevalent when large amounts of rainfall occur. This reinforces the belief that the amount of rainfall as a variable is secondary to rainfall occurrence in affecting maximum temperatures.

Because the maximum temperature falls within the eight-hour convective day, simply testing occurrences for that period obscured the fact that the occurrence of precipitation may have taken place after the time of the maximum temperature. Therefore, to avoid this situation the occurrence was examined at the smallest time interval available in climatological records, the hour. Using this time unit, the effect of the occurrence of rainfall before and after the maximum was easily distinguished. The following hypothesis was formulated utilizing the occurrence of rainfall in an hour by framework of time.

HYPOTHESIS: The hour of occurrence of air-mass convective rainfall has a significant effect on daily maximum temperatures.

The hypothesis was tested by comparing the average maximum temperature for days with rainfall occurrences against the average maximum temperature for days with no rainfall by the use of the "t" test.

An additional hypothesis was tested in order to measure the importance of the time of occurrence.

> Hypothesis: The average daily maximum temperature for hours of rainfall occurrence between 8 a.m. and 4 p.m. is significantly lower than the average maximum temperature for convective days in which rainfall did not occur between 8 a.m. and 4 p.m.

This hypothesis, like the preceding one, was tested at the 95 per cent significance level with a "t" test. To utilize the "t" test two averages were computed: (1) the average maximum temperature for hours of rainfall occurrence and (2) the average maximum temperature for no-rainfall days (Appendix VI).

The average maximum temperature for hours in which convective rainfall occurred was calculated by (1) noting the maximum temperature that corresponds to each hour in which there was an occurrence of rain and (2) averaging for each month the maximum temperatures for the same hour. For example, in Table 4 there were two occurrences of measurable rainfall at Baton Rouge for the 9-10 a.m. hour in July, 1969. They were on July 10 and 19 when the maximum temperature reached 82° and 80° respectively. The average of both of these temperature (81°) represented the average maximum temperature for hours of rainfall occurrence between 9 and 10 a.m. This figure for one month was then placed with other average July maximums for the same hour under the

TABLE 4

DAILY TEMPERATURES AND HOURLY PRECIPITATION AT BATON ROUGE, LOUISIANA, JULY 1969

Date	Hourly Precipitation A.M. Hour ending at 10	Hourly Precipitation A.M. Hour ending at 11	Maximum Temperature
1			99
2			96
3			99
4			98
5			95
6			92
7			97
8			97
9			97
10	.32	.13	82
11			88
12			93
13			94
14			96
15			94
16			91
17*			88
18*			88
19	.03	.04	80
20			88
21			92
22		.16	88
23	T		84
24			90
25			91
26			93
27			92
28			91
29*			90
30			91
31			91

*Non-Convective Days

Source: Local Climatological Data

measurable (M) occurrence column in Table 5. If there had been only one hour in which rainfall occurred, there would have been no average maximum temperature. For the 9-10 a.m. hour, there were numerous July's in which no more than one hour had a measurable occurrence. Thus, in Table 5 six of the ten years did not produce an average maximum for measurable rainfall occurrences.

TABLE 5

AVERAGE MAXIMUM TEMPERATURES FOR HOURS WITH RAINFALL AND DAYS WITHOUT RAINFALL FOR JULY 1969 AT BATON ROUGE, LOUISIANA[a]

Year	Average Maximum		Average Maximum Temperatures for Rainfall Occurrences A.M. Hour ending at					
			10			11		
	Non-Measurable Days	No Rainfall	M	T	MT	M	T	MT
1960	95.9	95.8						
1961	89.8	89.7						
1962	93.5	93.5						
1963	92.9	92.6	87.0		87.0			
1964	91.4	90.5		86.5	86.5		83.0	83.0
1965	92.5	92.2				85.0	90.0	88.8
1966	93.1	92.4	92.0		92.0	92.0	90.0	90.7
1967	91.6	91.1	84.0		84.0	86.0		86.0
1968	92.9	92.9		88.0	88.0	85.5	87.5	86.5
1969	93.6	93.6	81.0	84.0	82.0	83.3		83.3

M=Measurable T=Trace MT=Measurable and Trace

[a]Calculated from Climatological Data, Hourly Precipitation Data, and Local Climatological Data

The average maximum temperature for convective days in which measurable rainfall did not occur was similarly derived. All maximum temperatures for days with no rainfall or traces were averaged for the month. For July 1969 the average maximum was 93.6^{o} which was then placed with those averages from the other nine years (Table 5).

The "t" test was then run on those average maximums in the measurable (M) occurrence column of Table 5 and the average maximum temperatures for non-measurable rainfall for corresponding years. For the trace, as well as measurable and trace occurrences in combination, the same procedure was followed except that a new set of figures for the average maximum temperature for no rainfall was required (Table 5). These new maximums excluded the trace and thus were generally lower than the non-measurable maximums.

Hour of Occurrence of Convective Rainfall and the Mean July Maximum Temperature

Since the research hypothesis pertains to mean July maximum temperatures rather than daily maximums, the relationship between the hour of rainfall occurrence and the mean July maximum temperature needs to be examined. To analyze this problem the following hypothesis was formulated:

HYPOTHESIS: The hour of occurrence of air-mass convective rainfall has a significant effect on the mean July maximum temperature.

The hypothesis was tested by totalling all identical hours with convective rainfall occurrences for each July and correlating them with the mean July maximum temperature (Appendix VII). Measurable and trace occurrences were run separately and in combination for each station. For example, for the 9-10 a.m. hour in Table 4 there were two measurable occurrences, one trace, and three hours of occurrences combined. These figures were grouped with those for the other nine years in Table 6. Each column of hours of rainfall was correlated with the mean July maximum temperatures. The same procedure was followed for the other seven hours of the convective day.

TABLE 6

NUMBER OF HOURS OF CONVECTIVE RAINFALL AND THE MEAN MAXIMUM TEMPERATURE FOR EACH JULY AT BATON ROUGE, LA.

Year	Mean Maximum Temperature	Number of Hours of Convective Rainfall A.M. Hour ending at					
		10			11		
		M	T	MT	M	T	MT
1960	96.4	0	0	0	0	0	0
1961	88.0	0	0	0	0	0	0
1962	93.6	0	0	0	0	0	0
1963	91.6	1	0	1	0	0	0
1964	89.8	0	2	2	0	1	0
1965	91.5	0	0	0	1	3	4
1966	91.9	1	0	1	1	2	3
1967	89.4	2	0	2	3	0	3
1968	91.6	0	4	4	2	2	4
1969	91.8	2	1	3	3	0	3

M=Measurable T=Trace MT=Measurable and Trace

[a]Calculated from Local Climatological Data

Coefficients of correlation and determination resulting from the use of total hours of measurable occurrences were compared with those values derived earlier using the total amount of convective rainfall for each identical hour. The purpose of this procedure was to determine if measurable occurrences produce more significant (r) values and in what hours these differences occurred.

Radar Detected Cells and the Mean July Maximum Temperature

Many distant cells have cooling properties that affect a station's maximum temperature but go unnoticed using standard climatological records. Radar, however, has the advantage of detecting most of these cells. Thus, to determine the relationship between convective rainfall and maximum temperatures using radar an additional supportive hypothesis was introduced:

> Hypothesis: There is a significant inverse relationship between the number of cells within a given radius of a station and its mean July maximum temperature.

The hypothesis was tested using the Pearson correlation to establish a relationship between the number of cells within several radii of each station in the study area and the mean July maximum temperature. The minimum size of the radii was based on the average radius of an air-mass shower, between 3 and 5 miles (7)(34). Thus radii were used that extend considerably farther from each station than the radius of the normal shower in order to account for cloud cover. Radii of 5, 10, 15, and 20 miles were chosen and the number of cells in each correlated with the mean maximum temperature at 10 a.m., noon, and 2 p.m. CST (Appendix VIII).

Summary

The month of July was chosen for study because of its homogeneous atmosphere and high frequency of thunderstorms. Each July was examined for a period of ten years to reduce the effects of anomalous months. During this period, only those days in which fronts, polar air-masses, or tropical disturbances were absent were considered. The number of stations was limited because hourly precipitation and the maximum temperature were required for each convective day. Furthermore, the use of trace occurrences necessitated the use of only first-order stations for certain tests since traces were not available for cooperative stations. Trace occurrences were essential since they often represent the effects of a shower in the vicinity of a recording station or one that is in the formative or dissipating stage.

The statistical design incorporated the precipitation parameters with amount and occurrence as independent variables and the maximum temperature as the main dependent variable. Correlation analysis was utilized to determine the association between: (1) the mean July maximum temperature and monthly totals of daily and hourly rainfall and (2) the daily maximum temperature and rainfall totals for the day and hour.

Disregarding the rainfall amount, the occurrence of convective rainfall was introduced to determine if the daily maximum temperature was significantly lower on days when convective rainfall occurred than on days when no rainfall occurred. The occurrence was used in an hourly framework on the basis of the patterns the hourly interval produced in the testing of rainfall amounts. The average maximum temperature was calculated for hours of convective rainfall and tested against the average maximum temperature for days when rainfall did not occur. Since occurrences may be either measurable or trace, it was necessary to test both separately and in combination.

To test for the existence of a relationship with the mean July maximum temperature, all identical hours in which rainfall occurred were totalled for each month and correlated with the mean July maximum. This was done to produce coefficients of correlation for each hour at all study area stations showing the association between individual hours and the mean July maximum temperature.

To investigate the suitability of radar imagery, radar cell counts were correlated with the mean July maximum temperature. Radar echoes were extracted from film for the hours 10 a.m., noon, and 2 p.m. for July, 1965.

Basically, the methodology consisted of a series of statistical tests designed to reveal the variable which best accounts for the distribution of mean July maximum temperatures. In a framework of time, the amount of rainfall, regarded as the least effective precipitation variable, was tested first and was subsequently followed by the hour of occurrence and radar detected cells. The results of these tests were then used to test the validity of the overall research hypothesis.

PART II

DATA ANALYSIS

CHAPTER III

THE AMOUNT OF CONVECTIVE RAINFALL AND MAXIMUM TEMPERATURES

Of the many characteristics of air-mass showers, variability in precipitation amounts from individual cells is probably the most noticeable. Amounts may vary from cloudburst proportions in a cell of exceptional height to a trace in a newly forming or dissipating cell.

The amount of rainfall can have an inverse effect on the maximum temperature. Heavy rain, such as a cloudburst, is more likely to produce a lower maximum temperature because of saturated surface conditions and the typically longer duration of the rainfall. However, a shower need not be of cloudburst size to affect the maximum temperature. This is because showers are most frequent around the time of the maximum temperature when they are also at their peak intensity (5). Rainfall during this time of day often prevents the maximum temperature from reaching a normal level, particularly with increasing rainfall intensity. Thus it would appear that the generally low mean July maximum temperatures over the Gulf Coastal Plain are a result of the amount of rainfall. It is the purpose of this chapter to determine if there is a significant inverse relationship between the amount of convective rainfall and maximum temperatures.

Total July Convective Rainfall and the Mean July Maximum Temperature

Whereas mean July maximum temperatures are generally low over much of the coastal plain, rainfall totals are high and most stations have a July maximum. This suggests a very general relationship between July convective rainfall and the mean July maximum temperature. Therefore, using the total July convective rainfall as the independent variable and the mean July maximum temperature as the dependent one, each first-order station was tested for a significant relationship by the Pearson product moment correlation.

It can be seen from the figures in Table 7 that the magnitude of the correlation coefficients was generally low to moderate and inverse.[5] Only one station, Alexandria, had a statistically significant coefficient. Moreover, the coefficients of determination were extremely low. With the exception of Alexandria, the .31 coefficient at Apalachicola was the highest. Thus, for seven of the nine first-order stations, the variation in the total July convective rainfall explained less than 31 per cent of the variation in the mean July maximum temperature. However, this may be due to co-linearity.

Correlation coefficients were then arranged according to inland and coastal locations in an attempt to establish a spatial pattern (Table 8). From the available figures there was no detectable pattern between the geographic areas.

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[5]The following guide to the magnitude of the correlation coefficient was suggested by J.P. Guilford in Fundamental Statistics in Psychology and Education (New York: McGraw-Hill Inc., 1956), p. 145.

<.20 slight; almost negligible relationship
.20-.40 low correlation; definite but small relationship
.40-.70 moderate correlation; substantial relationship
.70-.90 high correlation; marked relationship
>.90 very high correlation; very dependable relationship

TABLE 7

CORRELATION COEFFICIENTS AND COEFFICIENTS OF DETERMINATION FOR TOTAL JULY CONVECTIVE RAINFALL AND THE MEAN JULY MAXIMUM TEMPERATURE[a]

Station	r	r^2
Alexandria, Louisiana	-.82	.67
Apalachicola, Florida	-.56	.31
Baton Rouge, Louisiana	-.52	.27
Jackson, Mississippi	-.47	.22
Meridian, Mississippi	-.31	.09
Mobile, Alabama	-.40	.16
New Orleans, Louisiana	-.55	.30
Pensacola, Florida	.17	.02
Tallahassee, Florida	-.38	.14

[a]Calculated from Local Climatological Data

TABLE 8

CORRELATION COEFFICIENTS FOR TOTAL JULY CONVECTIVE RAINFALL AND THE MEAN JULY MAXIMUM TEMPERATURE COASTAL AND INLAND STATIONS[a]

Inland		Coastal	
Station	r	Station	r
Alexandria	-.82	Apalachicola	-.56
Baton Rouge	-.52	New Orleans	-.55
Jackson	-.47	Pensacola	.17
Meridian	-.31		
Mobile	-.40		
Tallahassee	-.38		

[a]Calculated from Local Climatological Data

Thus, it may be concluded that the relationship between total July convective rainfall and the mean July maximum temperature is at best weak and in most cases negligible. One reason for the poor association may be seen in the figures in Table 9. Even though two monthly totals differ considerably, the mean maximum temperature is the same or similar.

TABLE 9

VARIATION OF TOTAL CONVECTIVE RAINFALL WITH THE SAME OR SIMILAR MEAN JULY MAXIMUM TEMPERATURE

Station	Rainfall	Temperature
Apalachicola	4.32"	87.9°
	1.46"	87.9°
Jackson	4.33"	91.2°
	.15"	91.7°
Pensacola	3.07"	88.5°
	.95"	88.6°
Tallahassee	11.11"	91.0°
	3.17"	90.8°

Source: Local Climatological Data

Total Daily Convective Rainfall and the Daily Maximum Temperature

Although total July convective rainfall is derived by summing daily totals, its failure to relate to the mean July maximum temperature does not eliminate the daily total rainfall as having an effect on the daily maximum temperature. This is because daily rainfall and maximum temperatures are based on convective days, whereas the mean July maximum temperature is based on both convective and non-convective days. Thus, the daily rainfall and maximum temperature association is not hindered by non-convective activity for it is not included. Therefore, individual daily rainfall totals were correlated with the daily maximum temperatures for two first-order stations, Baton Rouge and Pensacola.

The resulting coefficients of correlation and determination are shown in Table 10. With the exception of 1961 at both stations correlation coefficients are not statistically significant. Furthermore, excluding 1961, the variation in the daily amount of rainfall accounts for a maximum of only 23 per cent of the variation in the daily maximum temperature.

Consequently, on the basis of the stations tested, it may be concluded that while an inverse relationship exists, its magnitude is not of such dimension as to be termed statistically significant.

The extreme fluctuation of r values from year to year is further testimony to the weak association. Two factors appear to account for this, (1) the time of rainfall with respect to the maximum temperature and (2) the variability of convective rainfall amounts. Daily totals of convective rainfall obscure the actual time of rainfall, and thus it is unknown whether the rainfall occurred before, during, or after the time of the maximum temperature. Rainfall occurring after the maximum temperature, which is quite frequent in

TABLE 10

CORRELATION COEFFICIENTS AND COEFFICIENTS OF DETERMINATION FOR TOTAL DAILY CONVECTIVE RAINFALL AND THE DAILY MAXIMUM TEMPERATURE[a]

Baton Rouge			Pensacola		
Year	r	r^2	Year	r	r^2
1960	-.12	.01	1960	-.48	.23
1961	-.61	.37	1961	-.80	.64
1962	.18	.03	1962	.06	.00
1963	-.11	.01	1963	-.38	.14
1964	-.10	.01	1964	-.23	.05
1965	-.20	.04	1965	-.35	.12
1966	-.38	.14	1966	-.07	.01
1967	-.41	.17	1967	-.47	.22
1968	-.33	.11	1968	-.06	.00
1969	-.45	.20			

[a]Calculated from Local Climatological Data

the study area, will have a negligible effect on the maximum temperature regardless of the amount. Therefore, the amount may vary, but the maximum temperature will remain fairly constant, and the coefficient of correlation will be low.

In the previous test, Table 6 illustrated that widely varying July rainfall totals often have similar mean July maximum temperatures. A similar situation is illustrated by the data for Pensacola in 1964 (Table 11). Here, days with maximum temperatures of 88° and 89° have widely varying rainfall amounts.

TABLE 11

TOTAL DAILY CONVECTIVE RAINFALL AND MAXIMUM DAILY TEMPERATURES AT PENSACOLA, FLORIDA JULY 1964

Temperature	Rainfall	Temperature	Rainfall
89	.18	88	T
89	.64	88	.07
89	.36	88	0
89	0	88	1.01

Source: Local Climatological Data

Amount of Convective Rainfall for Each Hour and the Daily Maximum Temperature

Since daily convective rainfall totals mask the influence of the amount of rainfall in any individual hour, rainfall amounts for each hour of each day in July were computed. Thus, for example, all the rainfall occurrences between 9 a.m. and 10 a.m. were calculated for each day. These totals were then correlated with daily maximum temperatures in order to determine if there exists a significant inverse relationship between the amount of rainfall by hour and daily maximum temperatures. Correlation coefficients were computed for an inland station, Baton Rouge, and a coastal station, Pensacola (Table 12).

Although coefficients of correlation were low for most hours, a pattern began to emerge. Baton Rouge had its highest (r) values during the late morning hours indicating that these hours have the greatest retarding effect on the daily maximum temperature. In other words, the greater the amount of rainfall between 10 a.m. and noon, the lower the maximum temperature. In general, correlation coefficients

TABLE 12

CORRELATION COEFFICIENTS FOR THE AMOUNT OF CONVECTIVE RAINFALL BY HOUR AND THE DAILY MAXIMUM TEMPERATURE JULY 1965[a]

Station	A.M.				P.M.			
	9	10	11	12	1	2	3	4
Baton Rouge	-.15	-.15	-.65	-.31	-.08	-.10	-.05	.02
Pensacola	-.47	-.44	-.35	-.18	-.04	-.27	-.27	-.28

[a]Calculated from Local Climatological Data

decreased through the afternoon hours, although in Baton Rouge the (r) value became positive between 3 p.m. and 4 p.m. This shift to a positive sign was apparently an indication of the amount of heating that took place during the afternoon. That is, the greater the heating in the afternoon, the greater the number and intensity of showers. Once the maximum occurred, the amount of rainfall became a function of the maximum temperature.

At Pensacola, highest (r) values occurred during the early morning hours, an indication that the maximum temperature was retarded earlier by rainfall along the coast (Table 12). The drop in temperature during these hours, primarily 8 a.m. to 10 a.m., appears to have prevented the temperature from reaching a normal value at the time the sea breeze commenced.

Total July Convective Rainfall for each Hour and the Mean July Maximum Temperature

On the basis of the pattern of correlation co-efficients produced in the previous test, the rainfall at a particular hour was once again used as a variable. This time, rainfall amounts for each month were totalled for identical hours and correlated with the mean July maximum temperature. In the previous analysis an attempt was made to determin if the daily maximum temperature was a function of the amount of rainfall in individual hours. However, this analysis sought to establish whether the mean July maximum temperature was a function of the total July convective rainfall for individual hours. The test was run using first-order inland and coastal stations. While six of the stations produced one or more hours with a statis-tically significant coefficient of correlation, only three of these stations, Alexandria, Baton Rouge, and Apalachicola, had high correlations (Table 13).

As was the case with other tests involving the amount of convective rainfall, coefficients of correlation are generally low and fluctuate. For example, Meridian's correlation coefficient shifts from negative to positive during the mid-morning and mid-afternoon. The afternoon positive value is apparently a reflection of the amount of heating, but the morning value is a result of an exceedingly small amount of rainfall between 10 a.m. and 11 a.m. For the ten-year period of record, only .54" fell during the hour. The positive value came about because .25" of this amount, the largest one-month total, fell in a rather warm month, while .02" fell in the month with the lowest maximum temperature.

Nevertheless, some general patterns are revealed by the correlation coefficients. For most of the stations, and particularly the inland ones, the highest (r) values occur in the afternoon when rainfall amouns are normally greater. Among the inland stations, only Mobile has its highest (r) value in the morning although it is barely higher than the

TABLE 13

CORRELATION COEFFICIENTS FOR THE TOTAL AMOUNT OF CONVECTIVE RAINFALL BY HOUR AND THE MEAN JULY MAXIMUM TEMPERATURE [a]

Stations	A.M. Hour ending at				P.M. Hour ending at			
	9	10	11	12	1	2	3	4
Inland								
Alexandria		-.09	-.44	-.32	-.72	-.31	-.41	-.27
Baton Rouge	.03	-.24	-.23	-.68	-.71	.01	.27	.31
Jackson	-.22	.17	-.25	-.16	.05	-.45	-.51	-.65
Meridian	-.30	-.16	.37	-.38	-.23	-.30	.27	-.64
Mobile	-.21	-.42	-.03	-.06	-.09	-.18	-.41	-.35
Tallahassee	.16	.20	-.07	-.11	-.28	-.35	-.17	-.37
Coastal								
Apalachicola	-.20	-.14	-.25	-.21	.04	-.33	-.87	-.55
New Orleans	.19	.06	-.34	-.00	-.25	-.50	-.63	-.41
Pensacola	-.55	-.16	-.21	-.16	.43	.02	.23	.26

[a]Calculated from Local Climatological Data

2 p.m. to 3 p.m. value. It is interesting to note at this point that the total July convective rainfall for each hour produces afternoon maximum (r) values, whereas individual amounts for each hour when related to the daily maximum temperature produce morning maximum (r) values. Morning showers may produce a lower maximum temperature than the afternoon, but the

small afternoon retardation appears to be more important annually because of a higher frequency and intensity of rainfall, a point examined in detail in Chapter IV.

Summary

The use of the total July amount of convective rainfall for each hour produced the most distant pattern of all the tests. This variable revealed that rainfall during the afternoon hours had a greater inverse relationship with the mean July maximum temperature than the morning rainfall. However, the majority of coefficients were low and fluctuated. Thus, the total amount of convective rainfall for each hour does not appear to have adequately explained any significant variation in the mean July maximum temperature.

In spite of the fact that the hour produced somewhat of a pattern in the statistical tests of this chapter, there was little evidence to support the hypothesis that a significant inverse relationship between the amount of convective rainfall and maximum temperatures exists.

CHAPTER IV

THE HOUR OF RAINFALL OCCURRENCE AND THE DAILY MAXIMUM TEMPERATURE

The hour of occurrence was introduced as a new independent variable because of the pattern produced by hourly amounts in the previous chapter and the fact that the occurrence of convective rainfall has a significant inverse effect on the daily maximum temperature by testing the null hypothesis that there is no significant difference between the two variables.

Testing Procedure

The "t" test was used to test for the difference between the temperature for days with rainfall hours and those in which no rainfall occurred. For the month of July, daily maximum temperatures which occurred on a day of rainfall, were averaged for each hour in which precipitation fell. For example, if in a particular month convective rainfall fell on two days between the hours of 11 a.m. and noon, the daily temperatures achieved on those days were averaged. This figure represented the average maximum temperature for rainfall occurrences between 11 a.m. and noon daily and was subsequently calculated for the other seven hours of the convective day. The average maximum temperature for days with rainfall hours was correlated with the average maximum for convective days with no rainfall. An error was introduced by using all of the study area stations. Since cooperative stations often do not record traces, trace days were recorded as no rainfall days. Thus, when all the study area stations were utilized, only measurable occurrences were used in the test and the average maximum temperature for no rainfall became the average maximum for non-measurable rainfall. Since trace data are available at first-order stations, the "t" test was run for measurable and trace occurrences, both separately and in combination, at these stations.

Hour of Occurrence of Measurable Convective Rainfall and the Daily Maximum Temperature

Average Maximums for Measurable Occurrences and Non-Measurable Convective Days

Hourly Significance Levels

Significance levels were determined for the (t) values in Appendix IX and appear in Table 14. The significance level for each hour indicates the probability that the difference between the average maximum temperature for rainfall occurrences in a particular hour and the average maximum temperature for no-rainfall days was due to sampling error. The higher the significance level, the more significant was the difference between the averages.

TABLE 14

SIGNIFICANT LEVELS FOR THE "t" TEST: AVERAGE MAXIMUM TEMPERATURES FOR MEASURABLE RAINFALL OCCURRENCES AND THE AVERAGE MAXIMUM TEMPERATURE FOR NON-MEASURABLE RAINFALL DAYS

Stations	Significance Levels							
	A.M.		Hour Ending at:		P.M.			
	9	10	11	12	1	2	3	4
Inland								
Alexandria...				99.0*	90.0	90.0	80.0	95.0
Bainbridge...		99.5*	99.0	97.5	99.0	85.0	85.0	75.0
Baton Rouge..		97.5	99.5	99.5	99.5*	97.5	95.0	99.5
Brookhaven...		97.5	99.5*	97.5	97.5	95.0	97.5	97.5
Clinton ...	90.0	95.0	90.0	99.5*	85.0	97.5	80.0	80.0
Collins ...		97.5	95.0	97.5*	90.0	90.0	95.0	90.0
Crestview....	90.0	80.0	97.5*	95.0	95.0	90.0	90.0	95.0
Jackson		90.0	85.0	80.0	90.0	85.0	85.0	75.0
Lafayette....		97.5	99.5*	99.0	99.0	99.0	95.0	85.0
Meridian				97.5*	90.0	95.0	85.0	95.0
Mobile.......	99.5	99.5*	99.0	99.5	97.5	90.0	97.5	97.5
Saucier	99.5*	99.0	97.5	99.0	99.5	97.5	90.0	90.0
Tallahassee..	97.5	95.0	99.5	99.5	99.5*	99.5	99.5	97.5
Troy		95.0	99.5	99.5*	97.5	90.0	75.0	85.0
Tylertown....		85.0	95.0*	90.0	90.0	90.0	75.0	75.0
Wiggins				70.0	85.0	90.0	60.0	60.0
Woodville....	75.0		99.0*	97.5	90.0	90.0	60.0	90.0
Coastal								
Apalachicola.	99.5	99.5*	99.5	99.5	99.0	99.0	97.5	75.0
Burrwood	99.0	99.0	99.5*	99.5	95.0	95.0	95.0	70.0
Fort MOrgan..	97.5*	90.0	75.0	60.0	60.0	60.0	80.0	60.0
Lake Arthur..	70.0	70.0	90.0	80.0	90.0	80.0	85.0	75.0
Morgan City..	97.5*	80.0	75.0	80.0	80.0	90.0	90.0	80.0
New Orleans..		95.0	99.5	99.5*	99.5	99.5	97.5	97.5
Pensacola ...		99.5*	99.0	90.0	95.0	60.0	60.0	85.0
Vermilion ...	75.0	85.0	85.0	60.0	70.0	75.0	70.0	75.0

[a] Calculated from Climatological Data and Hourly Precipitation Data.

*Most significant hour for each station

A glance at Table 14 shows that frequently more than one hour was significant at several stations. In the case of Tallahassee, every hour was statistically significant at 95 per cent, the level at which the null hypothesis was rejected. The null hypothesis had a higher rejection rate in the morning hours, when 68 per cent of the hours in inland stations were above the 95 per cent level. This morning maximum of significant (t) values is clearly shown in Figure 21. Of the morning hours, the period from 11 a.m. to noon appears to be the most important, for 36 per cent of the significant (t) values occurred during this interval.

Along the coast, the hours at which the null hypothesis was rejected are more evenly distributed; however, a slight double maximum is evident (Fig. 22). The time from 9 a.m. to 11 a.m. and noon to 1 p.m. shows a slight maximum in the number of hours with significant (t) values. The latter hour may represent the cooling from inland storms whose cloud cover builds outward to the coast or simply from those that cross the coastline.

In addition, afternoon hours both inland and along the coast may have high significance levels due to the fact that these hours have been associated with low daily maximum temperatures that occurred as a result of earlier rainfall.

Also, the overlapping of rainfall from one hour to the next often resulted in the latter hour "benefiting" from the low maximums produced by the previous hour or vice versa.

The hours that have the most significant[6] effect on the maximum temperature are primarily those in the morning. Of the fifteen stations tested having a significant (t) value, only Tallahassee and Baton Rouge show a strong afternoon pattern of (t) values. On the other hand, 55 per cent of the inland stations had their most significant (t) value between 10 a.m. and noon (Fig. 23).

At coastal stations the maximum temperatures appear to be more a function of early morning convective rainfall. On the basis of six stations, 9 a.m. to 10 a.m. produced the greatest number of most significant (t) values (Fig. 24). This result strongly supports the theory that along the coastline maximum temperatures will be affected more by rainfall in the early morning than during any other period of the day.

Areal Distribution of Significant (t) Values

The spatial pattern of significant (t) values provides

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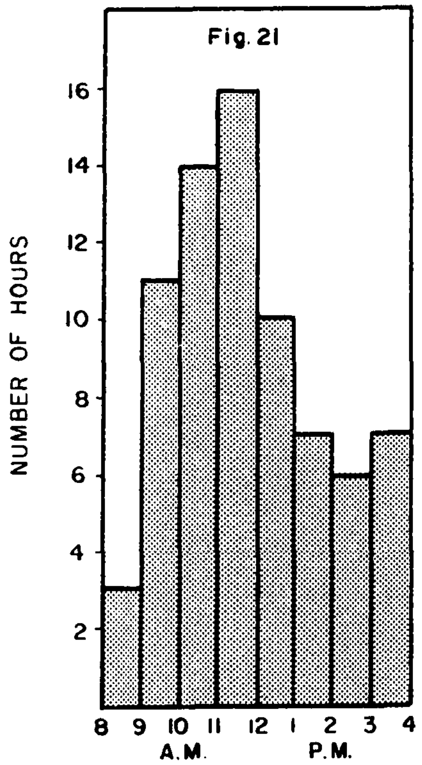
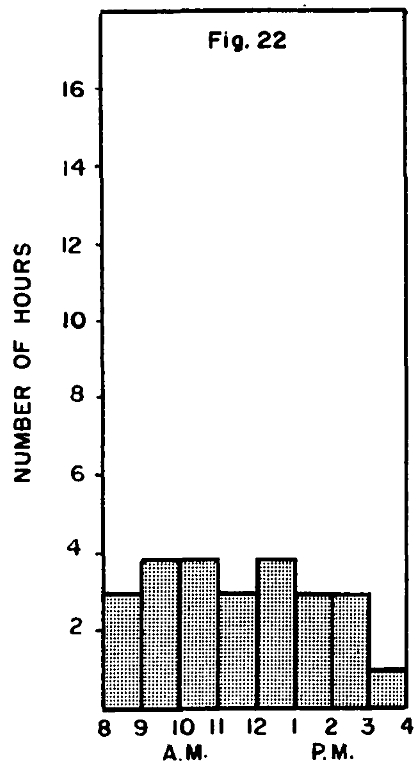
[6] A significance level of 95 per cent was considered statistically significant in the test. Many (t) values, however, have significance levels exceeding 95 per cent. Therefore, the "most significant (t) level value" is that (t) value with a level of 95 per cent or higher and which is the highest level for any hour at a given station.

NUMBER OF HOURS WITH SIGNIFICANT (+) VALUES



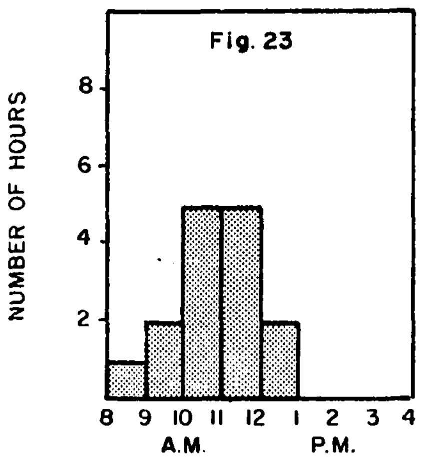
INLAND STATIONS

NUMBER OF HOURS WITH SIGNIFICANT (+) VALUES



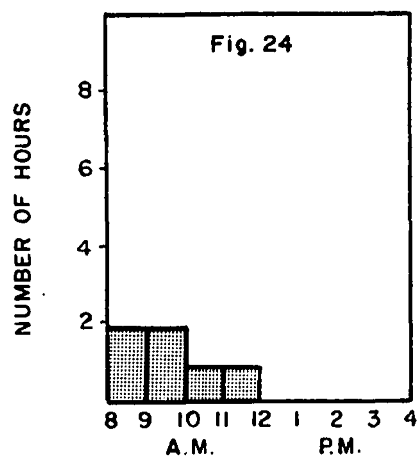
COASTAL STATIONS

NUMBER OF HOURS WITH MOST SIGNIFICANT (+) VALUES



INLAND STATIONS

NUMBER OF HOURS WITH MOST SIGNIFICANT (+) VALUES



COASTAL STATIONS

SOURCE: HOURLY PRECIPITATION DATA AND CLIMATOLOGICAL DATA

insight into (1) the areal extent of inland and coastal effects, (2) areas which do not benefit from cooling from convective rainfall, (3) the hour or hours which have the most widespread effect on maximum temperatures, and (4) those areas which have the potential for low maximum temperatures if rainfall occurs during certain hours.

From 9 a.m. to 10 a.m., convective rainfall is most likely to retard the daily maximum temperature if it falls along the coastline from Burrwood, Louisiana to Apalachicola, Florida and several inland areas such as the Mississippi River delta, south central Mississippi, southeast Alabama, and southwest Georgia (Fig. 25). Of the study area stations in close proximity to the coast, only Fort Morgan, Alabama has a (t) value that is not significant. However, Fort Morgan has a significant (t) value in the previous hour.[7] There is a marked difference in the coastal areas east and west of Burrwood. Whereas the Florida, Alabama, and Mississippi coasts have showers that significantly lower the maximum temperature, the coastline west of Burrwood produces rainfall maximum temperatures. Despite this area and the

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[7]There was an insufficient amount of data for mapping of the 8 a.m. to 9 a.m. hour.

one in southern Mississippi, precipitation during the 9 a.m. to 10 a.m. hour has a widespread effect on the daily maximum temperature.

The 10 a.m. to 11 a.m. hour does not introduce any great change in the area of significant (t) values. In Figure 26 the coastline west of Burrwood, eastern Louisiana, and the Alabama and Mississippi coasts, remain below the level of significance. The expansion of the latter area is largely due to the interpolation of the declining value at Fort Morgan. Still failing to reach significance at this hour are the far inland stations of Alexandria, Louisiana and Jackson and Meridian, Mississippi.

The 11 a.m. to noon map has the largest areal coverage of significant (t) values (Fig. 27). With the exception of Jackson, the inland stations create a rather continuous spread of significant (t) values east and west across the study area. Only in southern Mississippi is there a gap, as both Tylertown and Wiggins, Mississippi, two extremely warm stations, do not reach the level of significance. A shift in significant (t) values is evident as there is a decline in the (t) values along the entire coastline with the exception of Burrwood. This indicates the importance of the sea breeze, for during this hour it is well established and shower activity is negligible. For

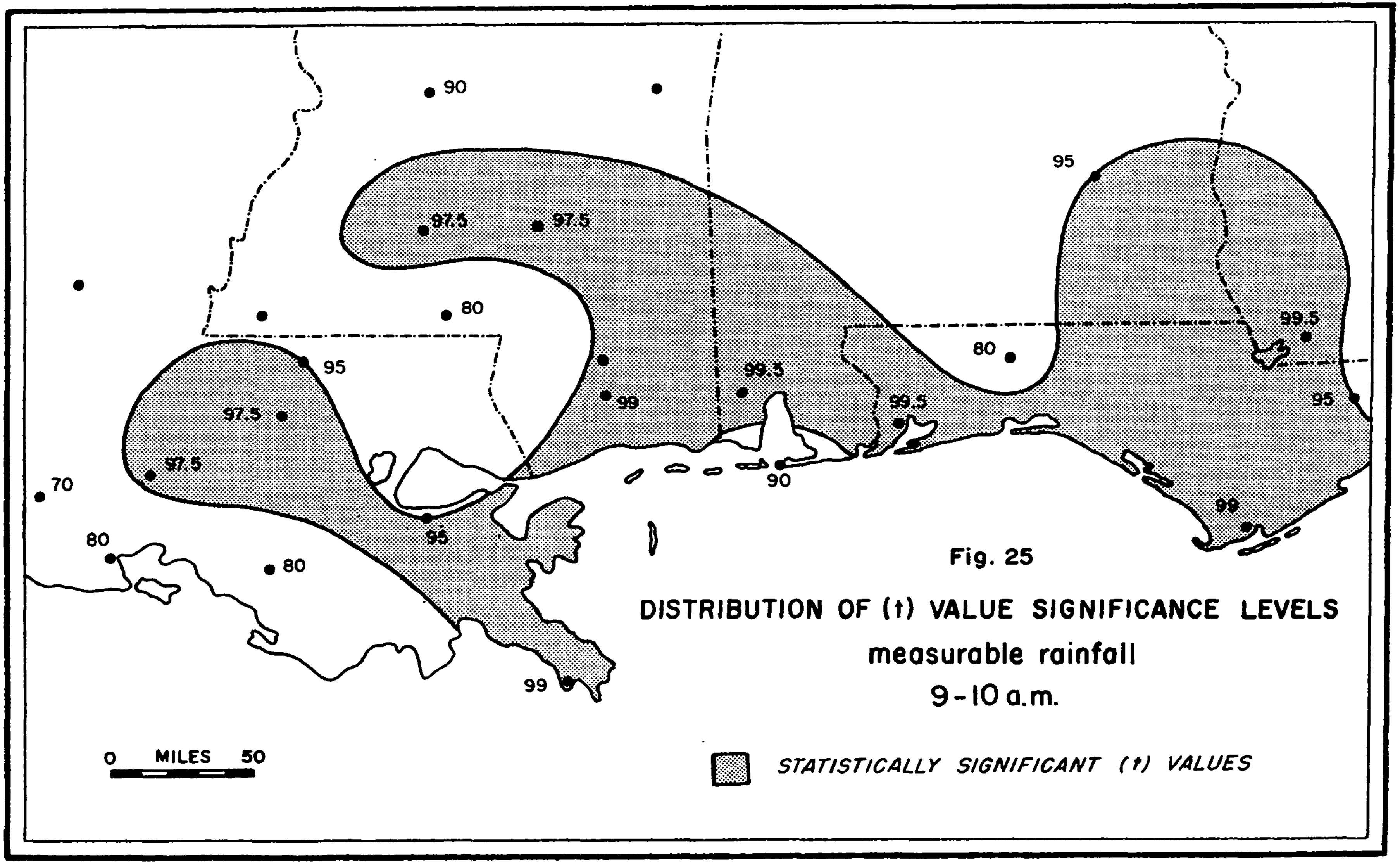


Fig. 25

DISTRIBUTION OF (t) VALUE SIGNIFICANCE LEVELS
measurable rainfall
9-10 a.m.

SOURCE: HOURLY PRECIPITATION DATA AND CLIMATOLOGICAL DATA

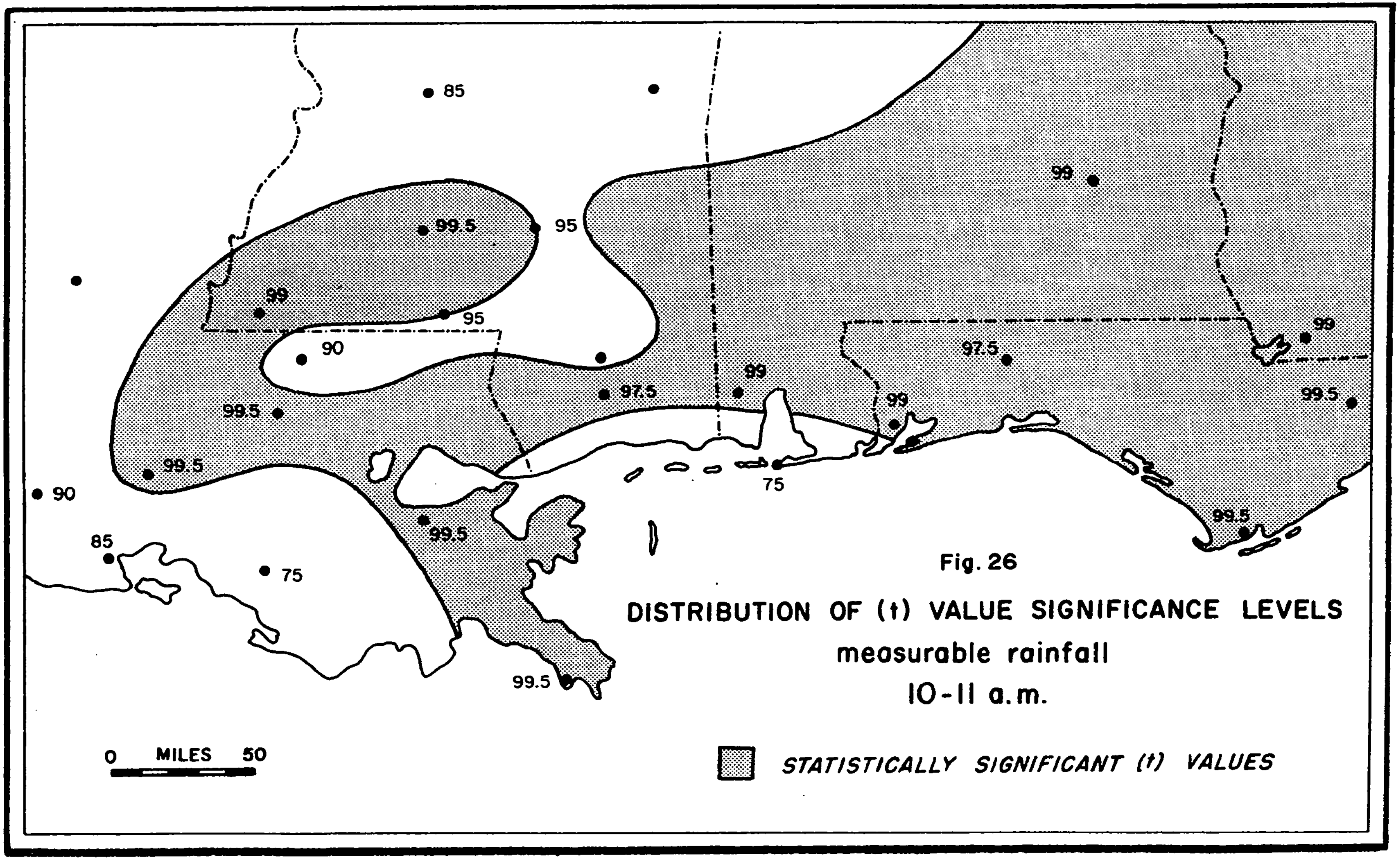


Fig. 26

DISTRIBUTION OF (t) VALUE SIGNIFICANCE LEVELS
measurable rainfall
10-11 a.m.

SOURCE: HOURLY PRECIPITATION DATA AND CLIMATOLOGICAL DATA

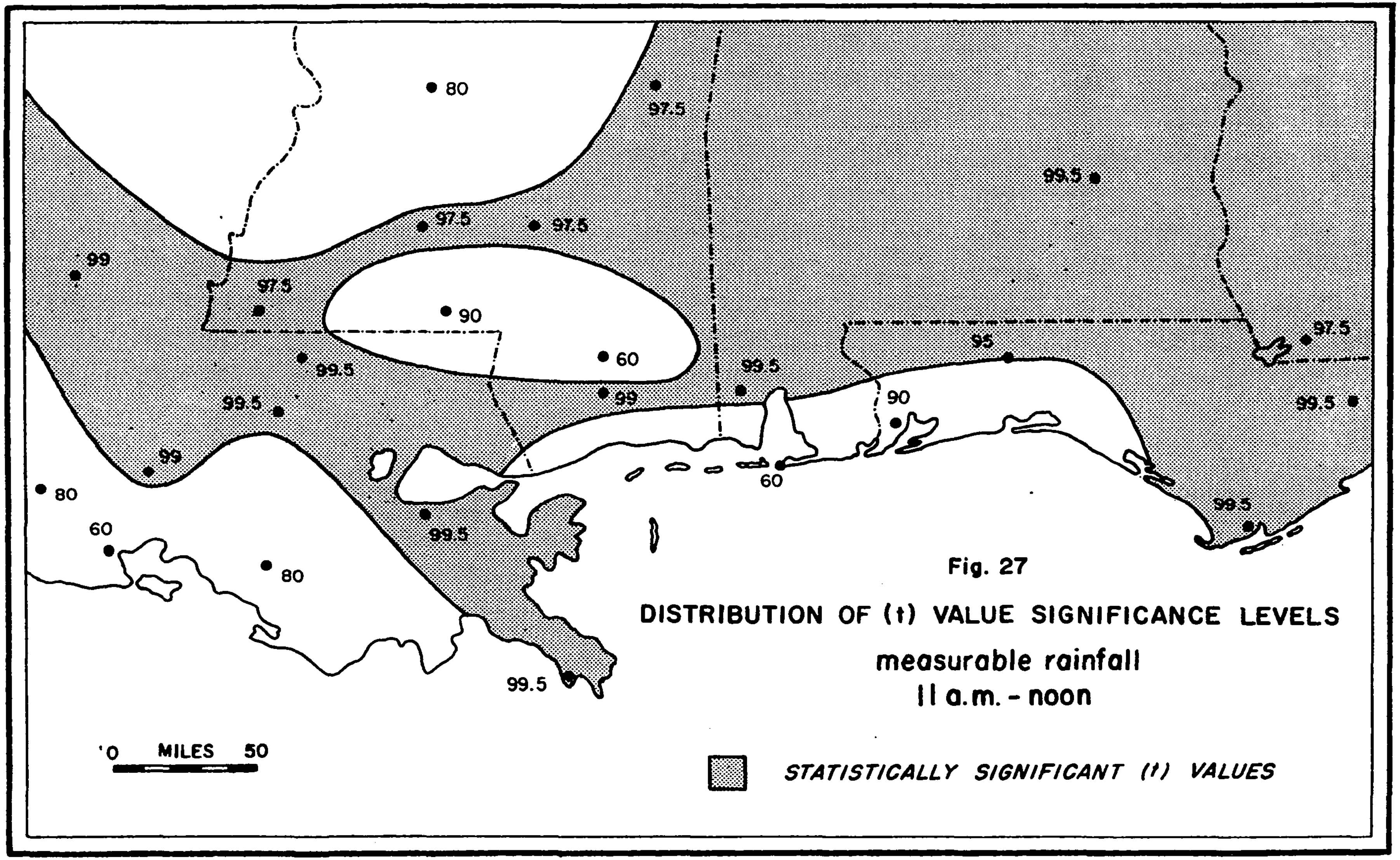


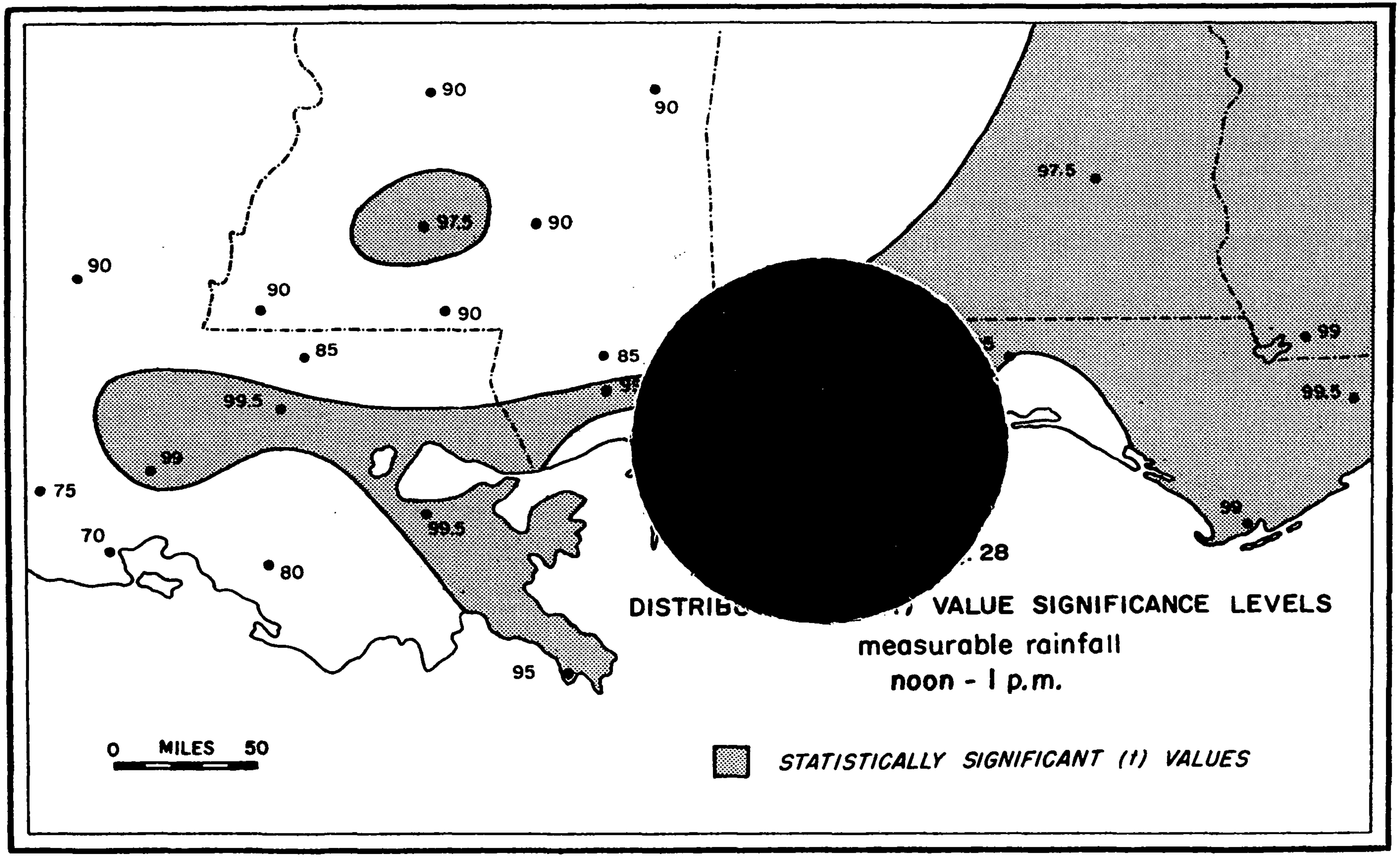
Fig. 27

DISTRIBUTION OF (t) VALUE SIGNIFICANCE LEVELS

measurable rainfall

11 a.m. - noon

SOURCE: HOURLY PRECIPITATION DATA AND CLIMATOLOGICAL DATA



[redacted] 28

DISTRIB[redacted] VALUE SIGNIFICANCE LEVELS
measurable rainfall
noon - 1 p.m.

SOURCE: HOURLY PRECIPITATION DATA AND CLIMATOLOGICAL DATA

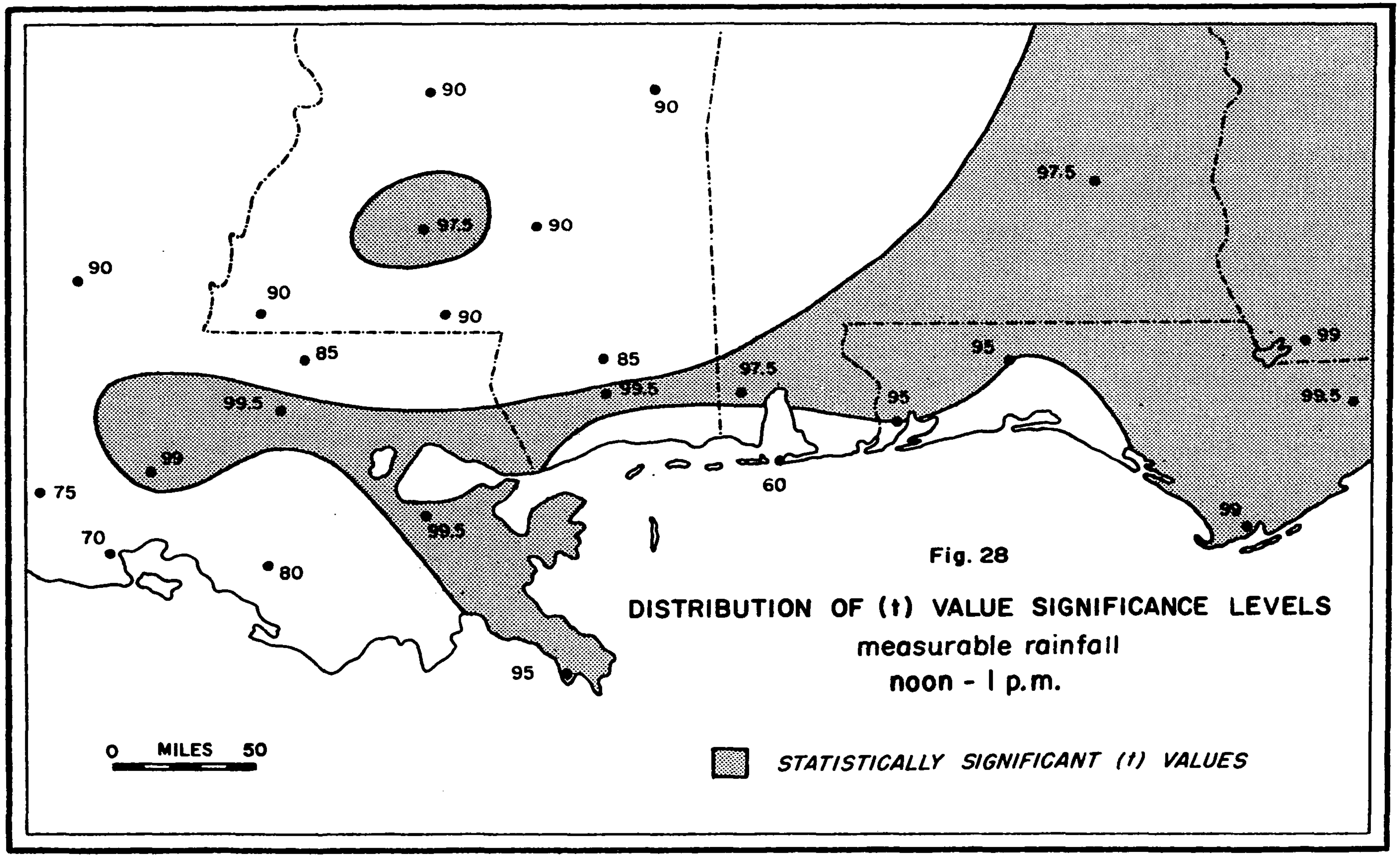


Fig. 28

DISTRIBUTION OF (t) VALUE SIGNIFICANCE LEVELS
measurable rainfall
noon - 1 p.m.

SOURCE: HOURLY PRECIPITATION DATA AND CLIMATOLOGICAL DATA

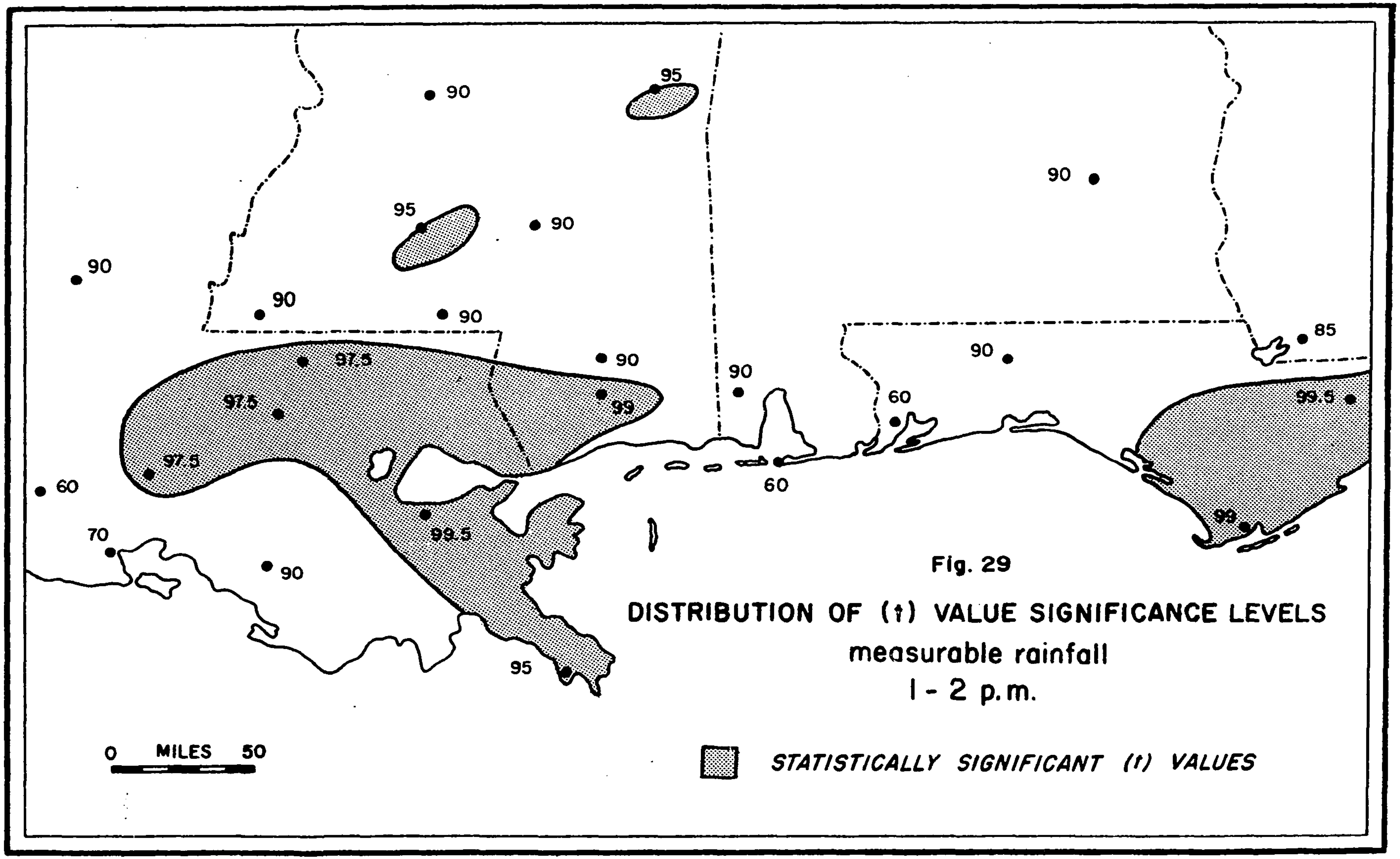


Fig. 29

DISTRIBUTION OF (t) VALUE SIGNIFICANCE LEVELS
measurable rainfall
1 - 2 p.m.

SOURCE: HOURLY PRECIPITATION DATA AND CLIMATOLOGICAL DATA

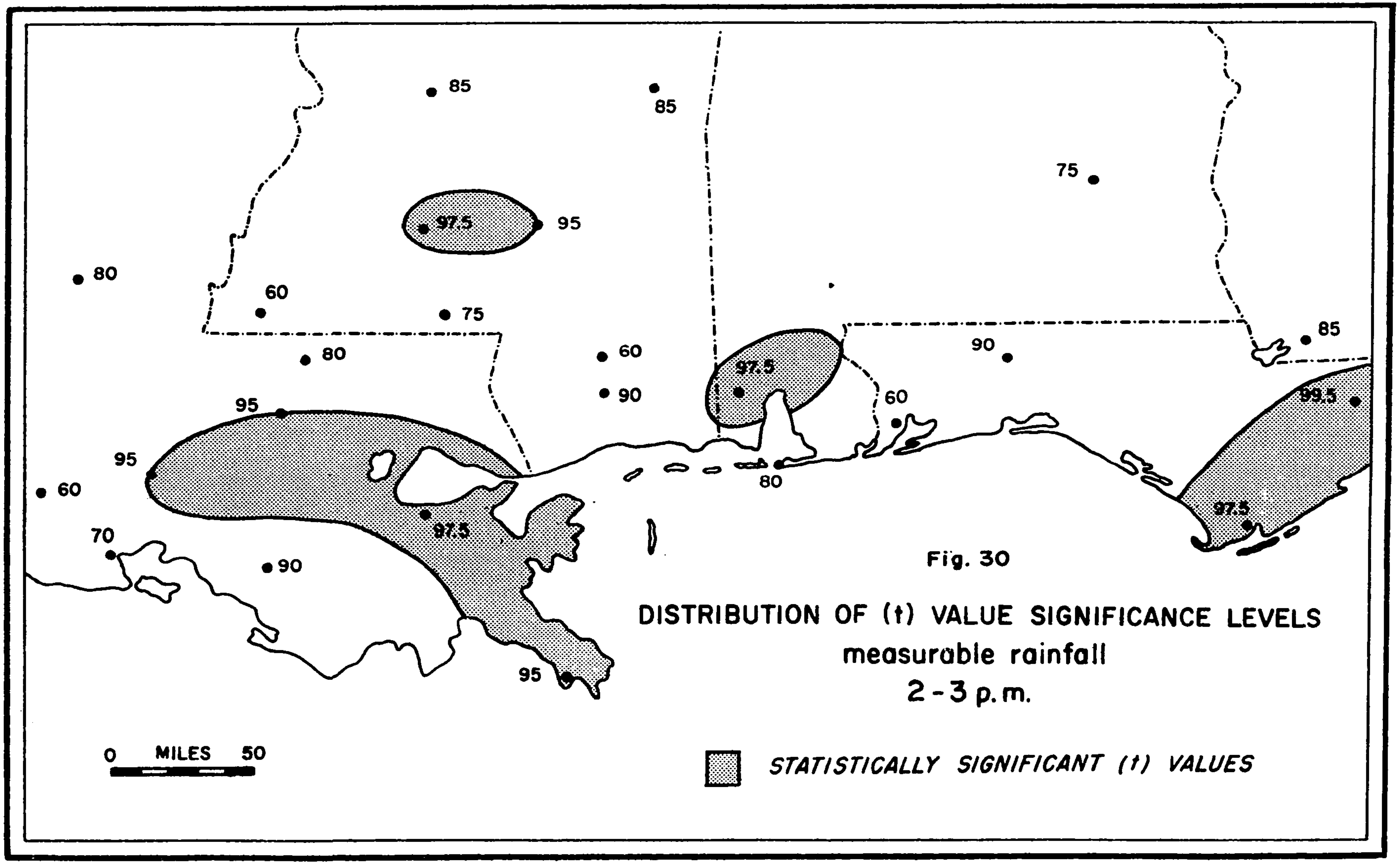


Fig. 30

DISTRIBUTION OF (t) VALUE SIGNIFICANCE LEVELS
measurable rainfall
2 - 3 p.m.

SOURCE: HOURLY PRECIPITATION DATA AND CLIMATOLOGICAL DATA

many coastal stations this is the time of the maximum temperature, the precise level being determined by whether there is a shower during the early morning. Although this is an important hour for influencing the maximum daily temperature, not every significant (t) value is the most significant (t) value for that station. This means that many stations have another hour or hous with higher significance levels and thus the 11 a.m. to noon hour does not produce the lowest maximum temperature for those stations.

As the time of the daily maximum temperature is approached, there is a considerable decline in (t) values. From noon to 1 p.m. most of the inland stations fall below the level of significance (Fig. 28). Convective rainfall occurring in this hour has little effect on the daily maximum temperature at these stations, for the temperature during this hour is not much different from the no -rainfall maximum which occurs an hour later. Convective rainfall still has a significant effect on stations closer to the coast such as Saucier, Mississippi and Mobile, Alabama. Here, the sea breeze convergence zone appears to be the chief agent of cooling.

A continual decline in the areal effect on the maximum daily temperature is noticeable on the 1 p.m. to 2 p.m. map (Fig. 29). Outside of isolated significant values at Brookhaven and Meridian, Mississippi, the only major area where rainfall still affects the daily maximum is over the Mississippi delta, the hills of eastern Louisiana, and the eastern Florida panhandle including Apalachicola and Tallahassee.

The areal distribution of significant (t) values reaches a minimum from 2 p.m. to 3 p.m. when only the Mississippi delta, the eastern Florida panhandle, and two isolated inland locations significantly affect the daily maximum temperature. However, there may not be a lowering of the maximum temperature at these locations. The high (t) values may be a result of showers around mid-day or earlier which lowered the daily maximum temperature. Significance levels are low because the maximum temperature has already taken place. (Fig. 30).

The spatial pattern of statistically significant (t) values is one of a gradual shift inland through the morning hours, a rapid decline in the early afternoon, and isolated areas of significant (t) values toward the end of the convective day. Two of these isolated areas, the Mississippi delta and the eastern Florida panhandle, have significant (t) values for the entire day.

Average Maximums for Measurable Occurences and No-Rainfall Convective Days

Since trace occurrences were not separated from zero rainfall at cooperative stations, the no-rainfall average is lowered by the effect of the trace. To show the magnitude of this effect, the (t) values for the first-order stations from the previous test were compared to those calculated from the average maximum temperature for no-rainfall in which the traces were separated (Table 15).

TABLE 15

(t) VALUES PRODUCED BY AVERAGE MAXIMUM TEMPERATURE FOR NO-RAINFALL CONVECTIVE DAYS: WITH AND WITHOUT TRACES[a]

Station		a.m.				p.m.			
		9	10	11	12	1	2	3	4
Alexandria	T				3.90	2.53	1.45	1.09	2.15
	no				4.29	2.94	1.68	1.28	3.35
Apalachicola	T	4.70	7.49	5.16	4.36	2.92	3.15	2.73	0.79
	no	4.81	7.70	5.12	4.48	3.04	3.29	2.77	0.93
Baton Rouge	T		5.04	6.82	5.08	5.31	2.58	1.98	3.04
	no		5.60	7.65	5.35	5.21	2.93	2.25	3.62
Jackson	T		2.49	1.64	1.09	2.43	1.13	1.22	0.72
	no		3.20	1.93	1.39	2.40	1.18	1.30	0.87
Mobile	T	5.73	6.68	3.69	3.80	2.73	1.62	2.14	2.54
	no	6.28	7.33	4.06	3.82	3.03	2.01	2.45	2.91
Meridian	T				3.00	1.53	2.26	1.13	2.03
	no				2.98	1.79	2.43	1.31	2.37
New Orleans	T		3.23	4.80	6.06	4.41	3.69	2.77	2.21
	no		3.31	4.80	6.07	4.70	3.92	3.32	2.81
Pensacola	T		5.06	3.28	1.54	2.15	0.40	0.38	1.30
	no		4.51	2.87	1.22	1.89	0.47	0.48	1.27
Tallahassee	T	3.72	3.12	7.69	7.00	7.70	4.19	3.29	2.57
	no	3.67	2.98	8.93	7.84	7.45	4.88	4.11	3.33

T = trace included no = trace omitted

[a]Calculated from Climatological Data and Hourly Precipitation Data

Since the sample size for the "t" test was the same, the higher (t) value in the comparison may be interpreted as being the more significant. Thus the (t) value for no-rainfall average maximum temperatures was more highly significant in 82 per cent of the hours. The "t" test would be more accurate with the use of no-rainfall average maximums, but as long as traces are omitted from cooperative station records they will have to be included in the non-measurable average maximum.

Hour of Occurrence of Trace Convective Rainfall and the Daily Maximum Temperature

It is apparent from the comparison of (t) values using no-rainfall and non-measurable rainfall average maximums that the trace has an inverse effect on the daily maximum temperature. This is because the (t) values were higher when the trace was separated from the no-rainfall average maximum temperature. Therefore, the "t" test was used to determine if the average maximum temperature for trace occurrences is significantly lower than the average maximum for convective days with no rainfall. Since trace rainfall is not published for cooperative stations, only first-order stations were used.

Table 16 shows the significance levels for the (t) values in Appendix X. All but one of the stations had at least one hour in which the convective trace-rainfall maximum temperatures were significantly lower than the no-rainfall maximums. Trace rainfall proved to be most significant during the afternoon hours for both inland and coastal stations. However, trace significance levels may be higher in the afternoon than they should be primarily because

TABLE 16

SIGNIFICANCE LEVELS FOR THE "t" TEST: AVERAGE MAXIMUM TEMPERATURES FOR TRACE RAINFALL OCCURRENCES AND THE AVERAGE MAXIMUM TEMPERATURE FOR NO-RAINFALL DAYS[a]

Stations	Significance Levels							
	Hour Ending at:							
	a.m.				p.m.			
	9	10	11	12	1	2	3	4
<u>Inland</u>								
Alexandria.....		90.0	90.0		99.5*	99.0	60.0	60.0
Baton Rouge....		97.5	99.0	99.5	99.5	99.5*	99.5	90.0
Jackson				85.0	80.0	75.0	70.0	60.0
Meridian.......				97.5*	85.0		85.0	60.0
Mobile		95.0	99.5	99.5*	99.5	95.0	60.0	90.0
Tallahassee....	97.5		95.0	99.5	99.5	99.5	99.5	97.5
<u>Coastal</u>								
Apalachicola...		95.0	95.0	70.0	99.5*	99.0	97.5	97.5
New Orleans ...				99.5	99.5*	99.0	95.0	97.5
Pensacola ...			75.0	60.0	60.0	95.0	97.5*	75.0

[a] Calculated from <u>Local Climatological Data</u>.

*Most significant hour for each station

of rainfall occurrences during earlier hours. Generally, significance levels for trace occurrences were lower than those for measurable occurrences in Table 14. Thus, trace rainfall while having some effect on the daily maximum temperature, it did not have the cooling power of measurable occurrences.

Hour of Occurrence of Measurable and Trace Convective Rainfall and the Daily Maximum Temperature

Measurable and trace occurrences were combined in order to produce a more effective representation of the convective cell. To determine if the combination results in significantly lower maximum temperatures than on the no-rainfall day, all maximum temperatures corresponding to either a trace or a measurable amount were averaged for identical hours and tested against the average maximum for no-rainfall convective days.

By including traces the significance is increased, because both the (t) value (Appendix XI) and the number of degrees of freedom become greater. For example, Alexandria had only one hour above the 95 per cent significance level before traces were included; it had six after their inclusion (Table 17).

Most noticeable is the large number of hours that affect the daily maximum temperature when traces are included.

TABLE 17
SIGNIFICANCE LEVELS FOR THE "t" TEST: AVERAGE MAXIMUM TEMPERATURES FOR MEASURABLE AND TRACE OCCURRENCES AND THE AVERAGE MAXIMUM TEMPERATURE FOR NO-RAINFALL DAYS[a]

Stations	Significance Levels, Hour Ending at: A.M. 9	10	11	12	P.M. 1	2	3	4
Inland								
Alexandria	80.0	95.0	95.0	99.5	99.5*	97.5	90.0	97.5
Baton Rouge	90.0	99.5	99.5	99.5	99.5	99.5	99.0	99.5
Jackson	99.0	99.5*	99.0	90.0	97.5	95.0	85.0	75.0
Meridian		99.5	97.5	99.5	97.5	97.5	90.0	85.0
Mobile	99.5	99.5*	99.5	99.5	99.5	97.5	95.0	97.5
Tallahassee	99.5	99.5	99.5	99.5	99.5*	99.5	99.5	99.5
Coastal								
Apalachicola	99.5	99.5*	99.5	99.5	99.5	99.5	99.5	99.0
New Orleans	99.5	99.0	99.5	99.5*	99.5	99.5	97.5	97.5
Pensacola	99.5	99.5*	99.0	99.5	90.0	80.0	80.0	60.0

[a]Calculated from Local Climatological Data
*Most significant hour for each station

Those (t) values not significant are primarily in the afternoon for stations located well inland. As with measurable occurrences, the hours that have the greatest retarding effect on daily maximum temperatures are in the morning for both coastal and inland stations.

The combined effects of measurable and trace convective rainfall present a more accurate picture for they account for the passage of convective cells over a recording station, as well as those which pass close and produce only a trace of rain and a cooling downdraft. In addition, weak cells in the developing or dissipating stage, which often produce trace rainfall and abundant cloud cover, would normally go unnoticed if only measurable rainfall was used. Although the trace does not have the cooling power of measurable occurrences, its contribution to cooling when in combination indicates that its importance cannot be underestimated.

CHAPTER V

THE HOUR OF RAINFALL OCCURRENCE AND THE MEAN JULY MAXIMUM TEMPERATURE

Having established that at certain hours convective rainfall significantly lowers the daily maximum temperature, the number of hours of convective rainfall occurrences in July was considered in order to determine what effect this precipitation parameter had on the mean July maximum temperature. To do this, the Pearson correlation was applied to the hour of occurrence and the mean July maximum temperature. Both measurable and trace occurrences, singly and in combination, were tested.

Hour of Occurrence of Measurable Convective Rainfall and the Mean July Maximum Temperature

Total hours of measurable convective rainfall were correlated with the mean July maximum temperature for each station for the period of study. Definite patterns in this correlation were apparent. Rainfall in certain hours had a marked inverse relationship with the mean July maximum temperature (Table 18). Interestingly, the hour having the greatest relationship with the mean July maximum temperature was not necessarily the same hour that most significantly influenced the daily maximum temperature.

TABLE 18

CORRELATION COEFFICIENTS FOR THE NUMBER OF HOURS OF MEASURABLE CONVECTIVE RAINFALL OCCURRENCE AND THE MEAN JULY MAXIMUM TEMPERATURE[a]

Stations	Coefficients							
	Hour Ending at:							
	a.m.				p.m.			
	9	10	11	12	1	2	3	4
Inland								
Alexandria	-.37	-.33	-.58	-.83*	-.78	-.42	-.39	-.76
Bainbridge	.18	.41	-.10	-.43	-.17	.07	-.64*	-.21
Baton Rouge	-.12	-.20	-.21	-.67	-.67	-.50	-.35	-.73*
Brookhaven	-.67	-.66	-.67	-.67	-.90*	-.71	-.66	-.73
Clinton	-.33	-.27	-.39	-.51	-.42	-.69*	-.32	-.20
Collins	-.55	-.62	-.45	-.63*	.04	-.59	-.41	-.54
Crestview	-.36	-.49	-.20	-.33	-.15	-.55*	-.31	-.22
Jackson	-.28	-.55*	-.33	-.16	-.01	-.12	-.50	-.48
Lafayette	-.56	-.19	-.50	-.57*	-.44	-.31	.07	-.08
Meridian	-.26	-.25	-.02	-.36	-.48	-.74	-.46	-.82*
Mobile	-.33	-.61*	-.46	.00	-.35	-.51	-.35	-.05
Saucier	-.63	-.80*	-.66	-.42	.01	.05	-.18	-.30
Tallahassee	-.13	-.22	-.02	-.26	-.51	-.40	-.28	-.78*
Troy	-.27	-.44	-.36	-.54*	-.47	-.16	.00	.16
Tylertown		-.56	-.45	-.68*	-.58	-.22	-.39	-.16
Wiggins		-.70*	-.30	-.39	-.55	-.51	-.44	-.31
Woodville	-.47	-.39	-.90*	-.32	-.24	-.65	-.46	-.84
Coastal								
Apalachicola	-.41	-.03	-.22	-.11	-.08	-.48	-.84*	-.69
Burrwood	.24	.13	-.10	-.27	-.50*	-.05	-.38	-.21
Fort Morgan	-.87*	-.68	-.58	-.02	-.38	-.68	-.70	-.48
Lake Arthur	-.63	-.59	-.50	-.85*	-.61	-.65	-.68	-.46
Morgan City	-.53*	-.29	-.09	-.47	-.38	-.13	-.10	-.39
New Orleans	-.43	-.25	-.29	-.15	-.38	-.60	-.74*	-.62
Pensacola	-.38	-.54*	-.45	-.08	-.37	-.29	.13	-.01
Vermilion	-.57	-.60	-.02	-.36	-.48	-.74	-.46	-.82*

[a]Calculated from Climatological Data and Hourly Precipitation Data.

*Highest coefficient for each station

Many stations had their highest correlation coefficient in the afternoon. In the previous chapter it was determined that the occurrence of rainfall in the morning hours produced lower daily maximum temperatures than if the rain came in the afternoon. However, the frequency of morning rainfall was not as great as that of the afternoon types and therefore the low maximum temperatures that were produced by morning rainfall had little effect on the mean July maximum temperature. On the other hand, the much higher frequency of showers in the afternoon had more influence on the mean July maximum temperature, because the small retardation of the daily maximum temperature was then frequent enough to modify the monthly maximum temperature.

For inland stations, highest negative correlations occur primarily during the morning hours, with the most prominent hour being 11 a.m. to noon (Fig. 31). Variations in the number of hours of convective rainfall at this interval explain more of the variance in the mean July maximum temperature than any other hour.

Somewhat obscured by the maximum correlation coefficients are those negative coefficients that are significant at 95 per cent but are not necessarily the highest at their respective stations (Table 19). When these are taken into consideration, the influence of the afternoon hours in inversely affecting the mean July maximum temperature increases. This is a result of the more numerous hours of convective rainfall in the afternoon. It can be seen in

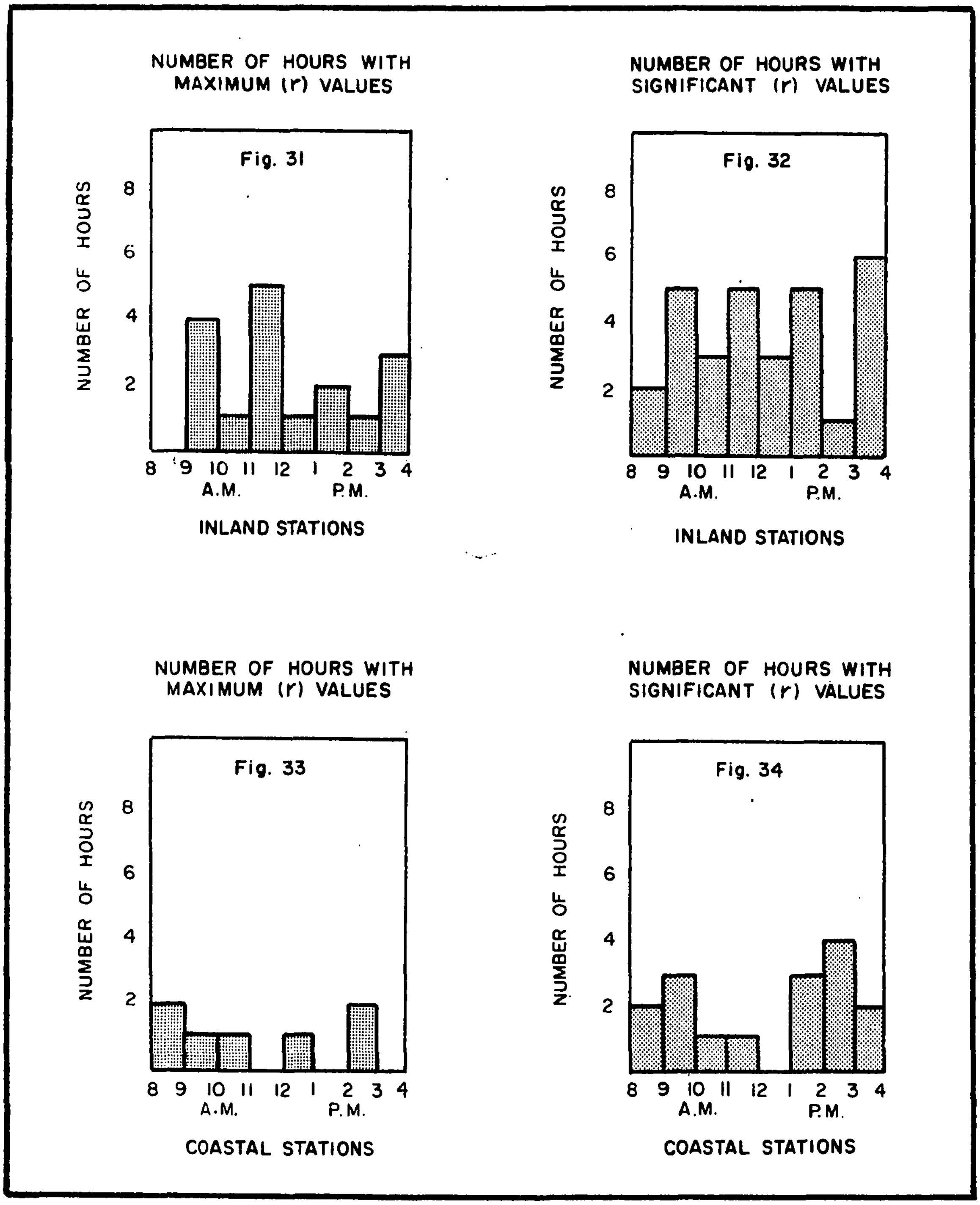
TABLE 19

CORRELATION COEFFICIENT SIGNIFICANCE LEVELS FOR THE NUMBER OF HOURS OF MEASURABLE CONVECTIVE RAINFALL OCCURRENCE AND THE MEAN JULY MAXIMUM TEMPERATURE[a]

Stations	Significance Levels							
	Hour Ending at:							
	A.M.				P.M.			
	9	10	11	12	1	2	3	4
Inland								
Alexandria	85.0	80.0	90.0	99.5*	99.5	85.0	85.0	99.5
Bainbridge	60.0	85.0	80.0	85.0	60.0	60.0	80.0	70.0
Baton Rouge	60.0	70.0	70.0	99.0	99.0	90.0	80.0	99.5*
Brookhaven	97.5	97.5	97.5	97.5	99.5*	97.5	97.5	99.0
Clinton	80.0	75.0	80.0	90.0	85.0	97.5*	80.0	80.0
Collins	95.0	95.0	85.0	95.0*	60.0	95.0	85.0	90.0
Crestview	80.0	85.0	60.0	75.0	60.0	90.0	75.0	60.0
Jackson	80.0	90.0	85.0	70.0	60.0	60.0	90.0	90.0
Lafayette	90.0	60.0	90.0	90.0	85.0	75.0	60.0	60.0
Meridian	75.0	75.0	60.0	85.0	90.0	99.5	90.0	99.5*
Mobile	80.0	97.5*	90.0	60.0	80.0	90.0	80.0	60.0
Saucier	97.5	99.5*	97.5	85.0	60.0	60.0	60.0	80.0
Tallahassee	60.0	75.0	60.0	75.0	90.0	85.0	80.0	99.5*
Troy	75.0	85.0	80.0	90.0	90.0	60.0	60.0	60.0
Tylertown		90.0	85.0	97.5*	90.0	70.0	85.0	60.0
Wiggins		97.5*	75.0	80.0	90.0	90.0	85.0	75.0
Woodville	85.0	85.0	99.5*	75.0	70.0	95.0	85.0	99.5
Coastal								
Apalachicola	85.0	60.0	70.0	60.0	60.0	90.0	99.5*	97.5
Burrwood	70.0	60.0	60.0	70.0	85.0	60.0	80.0	60.0
Fort Morgan	99.5*	95.0	90.0	60.0	80.0	95.0	95.0	85.0
Lake Arthur	95.0	90.0	85.0	99.5*	90.0	95.0	95.0	85.0
Morgan City	90.0	75.0	60.0	90.0	80.0	60.0	60.0	80.0
New Orleans	85.0	75.0	80.0	60.0	85.0	97.5	99.5*	97.5
Pensacola	80.0	90.0	85.0	60.0	80.0	75.0	60.0	60.0
Vermilion	90.0	95.0	97.5*	80.0	80.0	80.0	75.0	60.0

[a]Calculated from Climatological Data and Hourly Precipitation Data.

*Most significant hour for each station



SOURCE: HOURLY PRECIPITATION DATA

Figure 32 that the number of Significant r values in the afternoon is the same as that of the morning.

Maximum (r) values for coastal stations occur at two times, during the early morning hours when shower activity over the water is intense, and during the afternoon when there is cloud cover from inland showers or the showers themselves cross the coast. (Fig. 33). This afternoon maximum is illustrated by the high number of significant (r) values in the afternoon at coastal stations (Fig. 34).

Comparison of the Hour of Occurrence of Measurable Convective Rainfall and the Amount of Convective Rainfall

The hour of occurrence of convective rainfall rather than amounts explains more of the variation in the mean July maximum temperature. A comparison of coefficients of correlation and determination clearly reveal that these values are nearly always higher when the hour of convective rainfall occurence is the independent variable.

The "t" test and the Pearson correlation established that the morning hours have a considerable inverse effect on both the daily maximum temperature and the mean July maximum temperature. When (r) values for hours of convective rainfall occurrence are compared to those amounts of convective rainfall, it is clear that the latter fails to detect the importance of the morning hours in affecting maximum temperatures. In Table 20 the highest (r^2) value for any morning amount is .46 at Baton Rouge (11 a.m. to noon), whereas for the hour of occurrence of convective rainfall it is .69 at Alexandria (11 a.m. to noon). Thus, the hour

TABLE 20

A COMPARISON OF THE COEFFICIENTS OF CORRELATION AND DETERMINATION FOR THE HOUR OF OCCURRENCE OF MEASURABLE CONVECTIVE RAINFALL AND THE AMOUNT[a]

Stations		Coefficients							
		Hour Ending at:							
		A.M.				P.M.			
		9	10	11	12	1	2	3	4
Inland									
Alexandria	r 0	-.37	-.33	-.58	-.83	-.78	-.42	-.39	-.76
	A		-.09	-.44	-.32	-.72	-.31	-.41	-.55
	r^2 0	.14	.11	.34	.69	.61	.18	.15	.58
	A		.01	.19	.10	.52	.10	.17	.30
Baton Rouge	r 0	-.12	-.20	-.21	-.67	-.67	-.50	-.35	-.73
	A	.03	-.24	-.23	-.68	-.71	.01	.27	.31
	r^2 0	.01	.04	.04	.45	.45	.25	.12	.53
	A	.00	.06	.05	.46	.50	.00	.07	.10
Jackson	r 0	-.28	-.55	-.33	-.16	-.01	-.12	-.50	-.48
	A	-.22	.17	-.25	-.16	.05	-.45	-.51	-.65
	r^2 0	.08	.30	.11	.03	.00	.01	.25	.23
	A	.05	.03	.06	.03	.00	.20	.26	.42
Meridian	r 0	-.26	-.25	-.02	-.36	-.48	-.74	-.46	-.82
	A	-.30	-.16	.37	-.38	-.23	-.30	.27	-.64
	r^2 0	.07	.06	.00	.13	.23	.55	.21	.67
	A	.09	.03	.14	.14	.05	.09	.07	.41
Mobile	r 0	-.33	-.61	-.46	.00	-.35	-.51	-.35	-.05
	A	-.21	-.42	-.03	-.06	-.09	-.18	-.41	-.35
	r^2 0	.11	.37	.21	.00	.12	.26	.12	.00
	A	.04	.18	.00	.00	.01	.03	.17	.12
Tallahassee	r 0	-.13	-.22	-.02	-.26	-.51	-.40	-.28	-.78
	A	.16	.20	-.07	-.11	-.28	-.35	-.17	-.37
	r^2 0	.02	.05	.00	.07	.26	.16	.07	.61
	A	.02	.04	.00	.01	.08	.12	.03	.14

TABLE 20 -- Continued

		9	10	11	12	1	2	3	4
Coastal									
Apalachi-cola	r O	-.41	-.03	-.22	-.11	-.08	-.48	-.84	-.69
	A	-.20	-.14	-.25	-.21	.04	-.33	-.87	-.55
	r^2 O	.17	.00	.05	.01	.01	.23	.71	.48
	A	.04	.02	.06	.04	.00	.11	.76	.30
New Orleans	r O	-.43	-.25	-.29	-.15	-.38	-.60	-.74	-.62
	A	.19	.06	-.34	.00	-.25	-.50	-.63	-.41
	r^2 O	.18	.06	.08	.02	.14	.36	.55	.38
	A	.04	.00	.11	.00	.06	.25	.40	.17
Pensa-cola	r O	-.38	-.54	-.45	.08	0.37	-.29	.13	-.01
	A	-.55	-.16	-.21	-.16	.43	.02	.23	.26
	r^2 O	.14	.29	.20	.01	.14	.08	.02	.00
	A	.30	.03	.04	.03	.18	.00	.05	.07

O = Occurrence   A = Amount

[a]Calculated from Local Climatological Data

of occurence explains 23 per cent more of the variation in the mean July maximum temperature. In addition, 22 per cent of the morning (r) values representing rainfall amounts are positive, whereas less than one per cent of the hours of rainfall occurrence are positive. The large percentage of positive (r) values for the amount indicates a lack of the hypothesized inverse relationship between convective rainfall and the mean July maximum temperature. The hour of occurrence (r) value exceeds that of the amount for 70 per cent of all hours. The number of significant (r) values for rainfall amounts fails to exceed that of the hour of occurrence (Table 21). Although the number of significant (r) values occurrence variable is greater for only two hours, the final total shows that it has more than twice the number of

TABLE 21

NUMBER OF SIGNIFICANT HOURS: HOUR OF RAINFALL OCCURRENCE AND THE AMOUNT OF RAINFALL[a]

Variable	A.M. Hour ending at				P.M. Hour ending at				
	9	10	11	12	1	2	3	4	Total
Hour of Occurrence	0	1	0	2	2	2	2	6	15
Amount	0	0	0	1	2	0	2	2	7

[a]Calculated from Local Climatological Data

significant (r) values. Furthermore, a tabulation of the magnitude of the correlation coefficients shows that the hour of occurrence exceeds the amount in the number of moderate and high correlations (Table 22). Thus, it can be concluded that the hour of convective rainfall occurrence is a superior variable to the amount of rainfall in relating to the mean July maximum temperature.

TABLE 22

NUMBER OF MODERATE AND HIGH CORRELATION COEFFICIENTS: HOUR OF RAINFALL OCCURRENCE AND THE AMOUNT OF RAINFALL[a]

Variable	.4 - .69	.7 - 1.0
Hour of Occurrence	22	9
Amount	16	3

[a]Calculated from Local Climatological Data

Hour of Occurrence of Trace Convective Rainfall and the Mean July Maximum Temperature

Hourly correlation coefficients were calculated for first-order stations in order to determine the effect of traces on the mean July maximum temperature.

These coefficients reveal again that traces have a substantial effect on July mean maximum temperatures (Table 23). High correlations, particularly in the afternoon, are numerous. This is due to (1) the cooling power of the trace, substantiated by the "t" test, and (2) the high frequency of trace occurrences.

When traces occur in the morning their effect on the maximum is less than that of measurable rainfall, because temperatures are frequently able to restore their rate of increase acquired prior to the onset of the shower. In the early afternoon, however, the trace prevents the normal maximum temperature from being reached by lowering the temperature shortly before its peak and then retarding any climb until clearing. Thus the air does not have sufficient time to "rebound."

Traces appear to be most significant between 11 a.m. and 2 p.m., or the period immediately preceding the hour of the maximum temperature at the inland stations (Table 24). All stations exhibit one peak value, with several having a distinct secondary maximum. Only Alexandria has high (r)

TABLE 23

CORRELATION COEFFICIENTS FOR THE NUMBER OF HOURS OF TRACE CONVECTIVE RAINFALL OCCURRENCE AND THE MEAN JULY MAXIMUM TEMPERATURE[a]

Stations	Coefficients Hour Ending at: A.M. 9	10	11	12	P.M. 1	2	3	4
Inland								
Alexandria	-.82*	-.64	-.64	-.22	-.61	-.65	-.73	.03
Baton Rouge	-.09	-.11	-.05	-.30	-.55	-.70*	-.52	-.25
Jackson	-.62	-.39	-.37	-.74	-.91	-.27	-.27	-.28
Meridian	-.40	-.42	-.47	-.43	-.14	-.63*	-.48	-.45
Mobile	-.10	-.40	-.30	-.90	-.59	-.47	.32	-.10
Tallahassee	-.01	.17	-.25	-.06	-.26	.03	.29	-.04
Coastal								
Apalachicola	-.13	-.62	-.14	-.31	-.05	-.76*	-.11	-.70
New Orleans	-.42	-.56	-.48	-.14	-.84*	-.42	-.51	-.33
Pensacola	-.56	-.37	-.76	-.84*	-.43	-.12	-.47	-.26

[a]Calculated from Local Climatological Data

*Highest coefficient for each station

TABLE 24

CORRELATION COEFFICIENT SIGNIFICANCE LEVELS FOR THE NUMBER OF HOURS OF TRACE CONVECTIVE RAINFALL OCCURRENCE AND THE MEAN JULY MAXIMUM TEMPERATURE

Stations	Significance Levels							
	Hour Ending at:							
	A.M.				P.M.			
	9	10	11	12	1	2	3	4
Inland								
Alexandria	99.5*	95.0	95.0	75.0	95.0	95.0	97.5	60.0
Baton Rouge	60.0	60.0	60.0	80.0	90.0	99.0	90.0	75.0
Jackson	95.0	85.0	85.0	99.5	99.5*	80.0	75.0	80.0
Meridian	85.0	85.0	90.0	85.0	60.0	97.5*	90.0	90.0
Mobile	60.0	85.0	80.0	99.5*	95.0	90.0	80.0	60.0
Tallahassee	60.0	60.0	75.0	60.0	75.0	60.0	80.0	60.0
Coastal								
Apalachicola	60.0	95.0	60.0	75.0	60.0	99.0*	60.0	97.5
New Orleans	85.0	95.0	90.0	60.0	99.5*	85.0	90.0	85.0
Pensacola	90.0	85.0	99.0	99.5*	85.0	60.0	90.0	75.0

[a]Calculated from Local Climatological Data.

*Most significant hour for each station

values for the major portion of the convective day.

Hour of Occurrence of Measurable and Trace Convective Rainfall and the Mean July Maximum Temperature

Trace occurences were combined with measurable occurrences for each first-order station and the Pearson product moment correlation applied. Each resulting coefficient was tested for significance (Table 25 and 26).

TABLE 25

CORRELATION COEFFICIENTS FOR THE NUMBER OF HOURS OF MEASURABLE AND TRACE CONVECTIVE RAINFALL OCCURRENCE AND THE MEAN JULY MAXIMUM TEMPERATURE

	Coefficients							
	Hour Ending at:							
	A.M.				P.M.			
	9	10	11	12	1	2	3	4
Inland								
Alexandria	-.83	-.72	-.82	-.82	-.87*	-.84	-.82	-.53
Baton Rouge	-.14	-.22	-.13	-.76*	-.70	-.66	-.57	-.60
Jackson	-.64	-.54	-.44	-.57	-.71	-.26	-.51	-.50
Meridian	-.45	-.46	-.38	-.56	-.38	-.87*	-.57	-.33
Mobile	-.27	-.59	-.42	-.68*	-.51	-.53	-.25	-.09
Tallahassee	-.10	-.14	-.11	-.22	-.46	-.29	-.12	-.53*
Coastal								
Apalachicola	-.50	-.24	-.23	-.22	-.08	-.71	-.75	-.77*
New Orleans	-.53	-.47	-.48	-.32	-.66	-.68	-.80	-.64
Pensacola	-.51	-.60	-.68*	-.43	-.47	-.15	-.19	-.11

[a]Calculated from Local Climatological Data.

*Highest coefficient for each station

Compared to the results of the tests involving measurable and trace occurrences separately, all hours for the occurrences combined have negative correlation coefficients, most displaying a noticeable increase in (r) values. The number of significant (r) values inland increases over those of measurable occurences for all hours except 3 p.m. to 4 p.m., with the largest gain occurring between 11 a.m. and 3 p.m. (Fig.35).

TABLE 26

CORRELATION COEFFICIENT CONFIDENCE LEVELS FOR THE NUMBER OF HOURS OF MEASURABLE AND TRACE CONVECTIVE RAINFALL OCCURRENCE AND THE MEAN JULY MAXIMUM TEMPERATURE

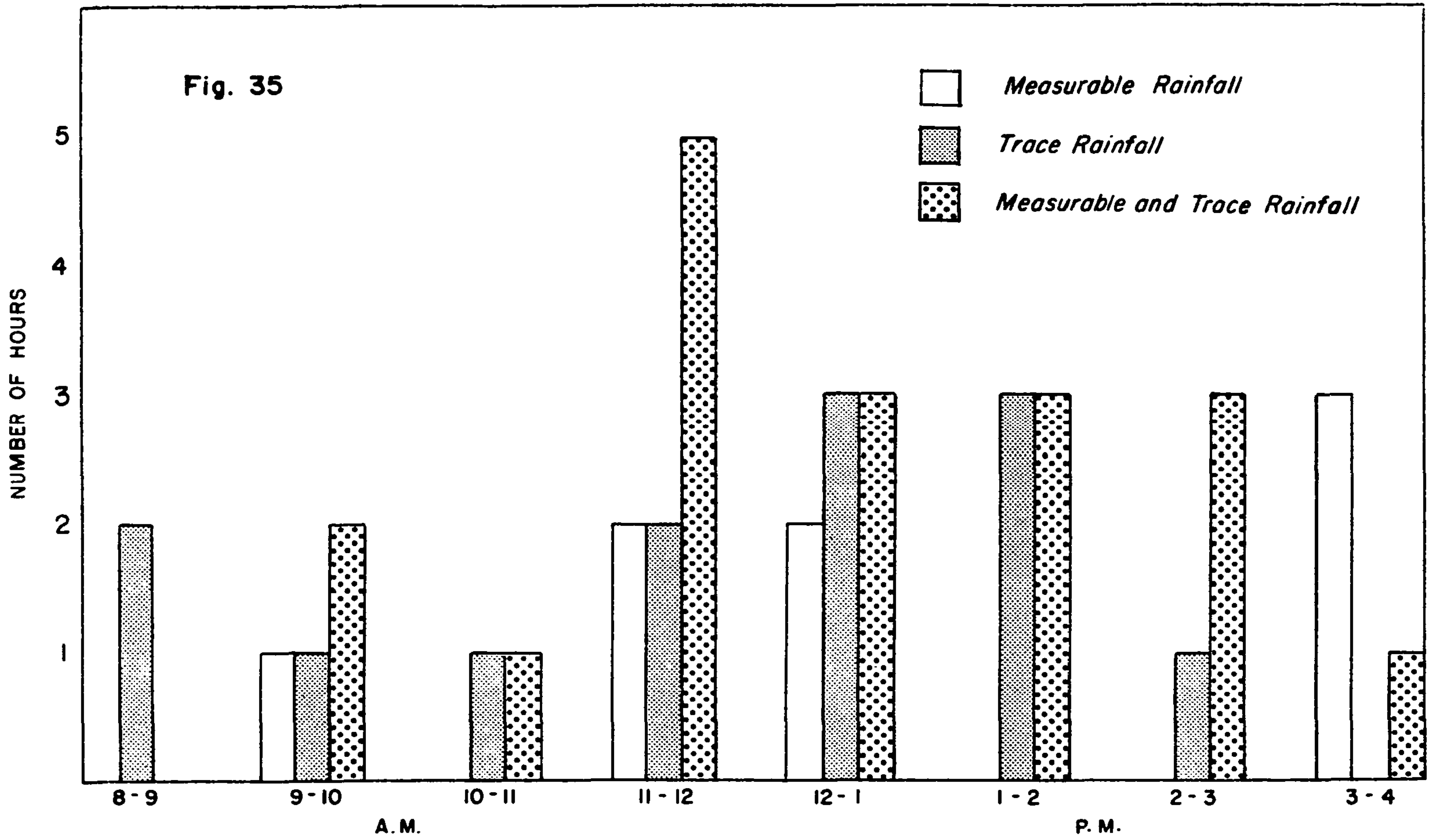
Stations	Significance Levels							
	Hour Ending at:							
	A.M.				P.M.			
	9	10	11	12	1	2	3	4
Inland								
Alexandria	99.5	97.5	99.5	99.5	99.5*	99.5	99.5	90.0
Baton Rouge	60.0	75.0	60.0	99.5	99.0	97.5	95.0	95.0
Jackson	97.5	90.0	90.0	95.0	99.0*	75.0	90.0	90.0
Meridian	90.0	90.0	85.0	95.0	85.0	99.5*	95.0	80.0
Mobile	80.0	95.0	85.0	97.5	90.0	90.0	75.0	60.0
Tallahassee	60.0	60.0	60.0	75.0	90.0	80.0	60.0	90.0*
Coastal								
Apalachicola	90.0	75.0	75.0	75.0	60.0	97.5	99.0	99.0*
New Orleans	90.0	90.0	90.0	80.0	97.5	97.5	99.5*	97.5
Pensacola	90.0	95.0	97.5*	85.0	90.0	60.0	60.0	60.0

[a]Calculated from Local Climatological Data.

*Most significant hour for each station

Since fluctuations of the (r) values are held to a minimum, hours of measurable and trace occurrences generally show a "smooth" pattern, for there is a gradual increase and decrease to and from the peak negative value. Maximum (r) values occur around mid-day and in the early afternoon. This is only slightly later than the period which has the greatest

NUMBER OF HOURS WITH SIGNIFICANT CORRELATION COEFFICIENTS
FIRST-ORDER INLAND STATIONS



SOURCE: LOCAL CLIMATOLOGICAL DATA

inverse effect on the daily maximum temperature and indicates the importance of the frequency of occurrence and the trace in relating convective rainfall to the mean July maximum temperature. Thus the high negative correlation coefficients and significance levels in the afternoon are not necessarily due to significant cooling, but rather to an excessive number of occurrences of convective rainfall.

Radar Detected Cells and the Mean July Maximum Temperature

Although the combination of measurable and trace occurrences provides the greatest relationship with the mean July maximum temperature, the effect of rainfall occurrences near a recording station is not included in the relationship. The detection of these cells by radar imagery produces a variable which approaches a measurement of the total convective effect: *i.e.*, the inclusion of radar detected cells enables one to interpret both the cooling effect of cells over the station and at some distance from it. If the cooling effect of all cells, regardless of the distance, could be determined at a given station, this would be the total convective cooling effect.

To test this idea the number of cells identified by radar, within 5-,10-,15-, and 20-mile radii of each station, were correlated with mean July maximums. Only those stations which significantly affect the daily maximum temperature were used in the correlation. To evaluate as many stations as possible, additional stations were chosen from those areas in Figures 25-30 which equal or exceed the 95 per cent level of significance as long as they record a mean maximum temperature for July 1965. Cells were correlated at two-hour intervals for the period between 10 a.m. and 2 p.m. (Table 27).

TABLE 27

CORRELATION COEFFICIENTS FOR THE NUMBER OF RADAR DETECTED CELLS AND THE MEAN MAXIMUM TEMPERATURE FOR JULY 1965[a]

Time	RADII IN MILES			
	5	10	15	20
10 a.m.	-.26	-.28	-.34	-.47
Noon	-.62	-.70	-.69	-.70
2 p.m.	.79	.66	.61	.62

[a]Calculated from National Weather Service radar film

At 10 a.m. for inland stations only 22 per cent of the variation in the mean maximum temperature was explained by radar detected cells. This is not unexpected as it corresponds with the results of earlier tests. Distance from stations has an effect on the values for coefficients are lowest at short ranges but increase with increasing radii.

In contrast to the low correlation coefficients at

10 a.m., noon values are negative, high, and statistically significant for all radii. At 10 and 20 miles the variation in the number of cells from station to station accounts for as much as 49 per cent of the variation in the mean July maximum temperature. For the 5- and 15- mile radii the values are only slightly less. These high values substantiate earlier results, for rainfall occurrence at this period of the day had the greatest effect on maximum temperatures. The values derived at this hour are even more significant when it is realized that these are instantaneous values compared to the accumulated hours of occurrence used in earlier tests.

A shift from negative to positive coefficients between noon and 2 p.m. begins to appear for the first time. Such a shift is not readily apparent in earlier tests on individual stations but is boldly evident in radar imagery. Positive correlation coefficients probably indicate that the temperature is now affecting cell development. That is, the higher the maximum temperature, the greater the number of cells around a given station. This appears to be a reflection of the surface heating, for with a high maximum temperature convective currents are stronger. A high density of cells before the time of the maximum temperature, however, increases the probability of a cell passing over a station or of any of several cooling factors, such as cloud cover, lowering the temperature. In earlier tests inverse relationships were common during the afternoon hours. This may be largely the result of rainfall that occurred around mid-day. Thus the afternoon negative coefficients for many stations may not be solely due to rainfall during that period, but from frequent mid-day rainfall which produced low maximum temperatures. Therefore, the afternoon hours often "benefit" from the low maximums produced earlier by having high negative coefficients.

The problem of the effects of early rainfall overlapping into other hours may be alleviated by radar imagery. Because radar provides an instantaneous picture of convective cells, a more direct relationship may be established between rainfall and maximum temperatures. This is due to a reduction in the interference from earlier hours which produces many high inverse relationships in the afternoon hours. Thus radar is more independent of earlier rainfall than standard climatological records.

A Comparison of Radar Detected Cells and the Number of Hours of Rainfall Occurrence

To compare the effectiveness of radar imagery with the occurrence of rainfall, correlations were made on the same stations. Hours of occurrence were correlated with maximum temperatures for both the hour preceding and following the instantaneous radar observation time (Table 28).

TABLE 28

A COMPARISON OF CORRELATION COEFFICIENTS FOR RADAR DETECTED CELLS AND THE NUMBER OF HOURS OF CONVECTIVE RAINFALL OCCURRENCE [a]

Time	RADAR DETECTION (radii in miles)				HOURS OF OCCURRENCE	
	5	10	15	20	HOUR BEFORE	HOUR AFTER
10 a.m.	-.04	.13	.02	.14	-.37	-.14
Noon	-.67	-.59	-.62	-.59	-.31	.23
2 p.m.	.78	.61	.67	.77	-.14	-.11

[a]Calculated from National Weather Service radar film

The comparison reveals the effectiveness of radar, particularly during the critical noon period, when measurable occurrences show only low correlation coefficients. Once again radar indicates a shift between noon and 2 p.m. to positive coefficients which is not evident in the hour of occurrence results. At the noon hour, the maximum correlation at a radius of 5 miles indicates that showers covering a 10-mile-wide region have the greatest inverse relationship with the maximum temperature.

The use of radar to determine the relationship of convective activity between stations to the distribution of mean July maximum temperatures has proven effective for the small sample period used. The noon hour, as with earlier tests, has again shown to be of great influence on the maximum temperature. High correlations for instantaneous observation times made the findings even more significant, for if they were expanded to a one-hour period, higher correlations should result. The laborious procedure of extracting past data from radar films makes on-the-spot compilation of cells necessary if lengthy periods of study are to be used. An analysis of individual years may prove more enlightening if radar rather than occurrences are used. If enough stations recorded traces, however, significant patterns would probably evolve using the occurrence variable.

The Hourly Distribution of Radar Detected Cells

The maps from which radar detected cells were correlated with the mean July maximum temperature reveal patterns that confirm many of the statistical results in this and previous chapters. Although thousands of cells were plotted for both New Orleans and Apalachicola, it must be pointed out that the data was accumulated for only one month, July 1965.

New Orleans

In Figure 36, the 10 a.m. radar map for New Orleans, cells are predominant over the Gulf of Mexico, although at this time the number over the land is rapidly increasing. The greatest density inland is along the Mississippi and Alabama coastal flatlands. Many of these cells may be remnants of the nocturnal coastal pattern. Nieuwold (22), in a study of convective rainfall in Southeast Asia, found coastal rainfall patterns extending inland as far as 20 miles.

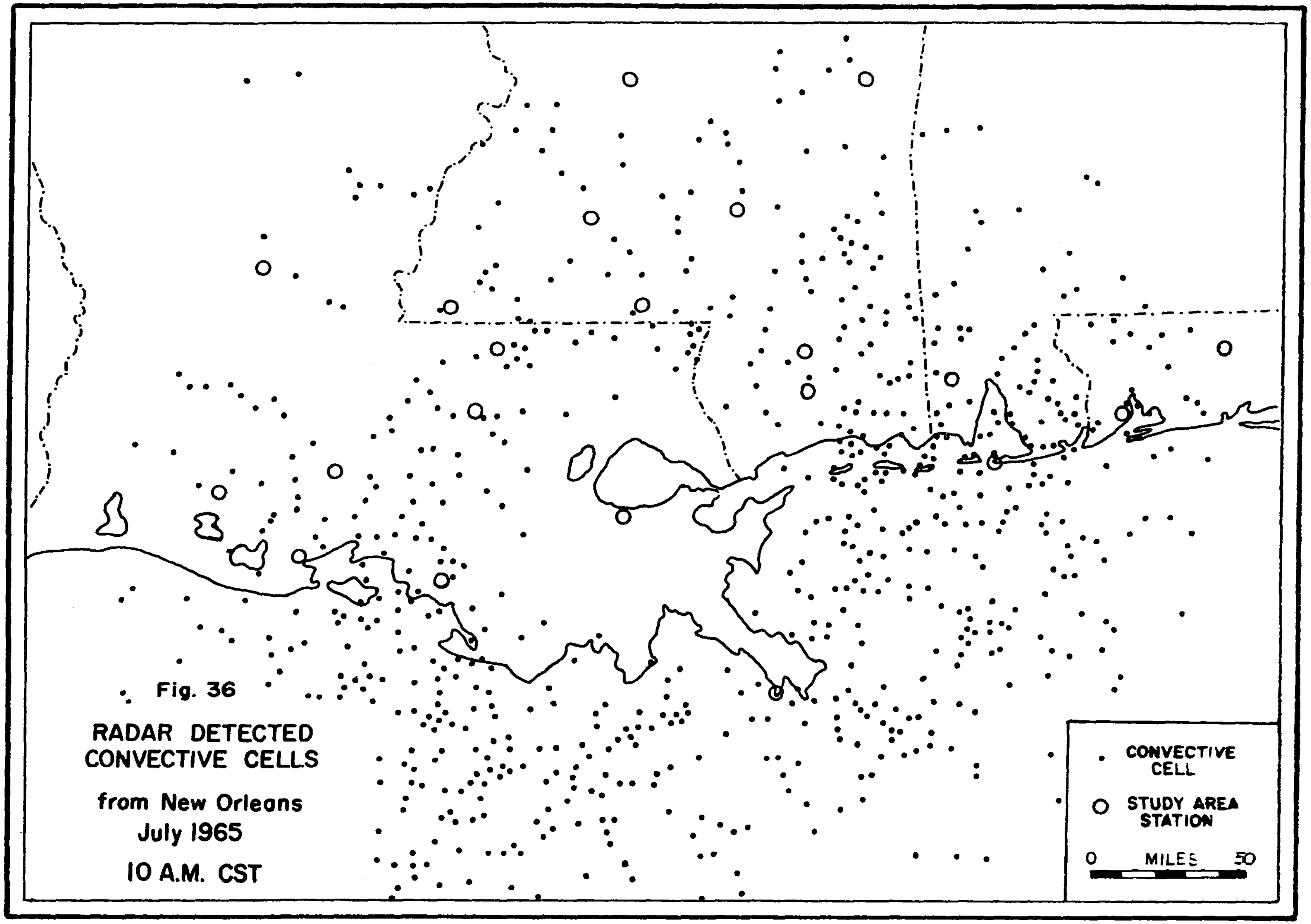


Fig. 36

RADAR DETECTED CONVECTIVE CELLS from New Orleans July 1965 10 A.M. CST

SOURCE: NATIONAL WEATHER SERVICE RADAR FILM

Many of these lingering showers produce extremely heavy rainfall. Ramage (24) indicated that heavy rainfall over coastal lowlands as the nocturnal pattern is diminishing is due to the onset of the sea breeze in areas that are still highly unstable. West of the Mississippi, however, cells are more evenly dispersed over the vast bayou country of southwestern Louisiana. Further inland, where activity is just beginning, the largest number are located from Baton Rouge northeastward to an area north of Wiggins, Mississippi.

At noon, the area of maximum cell density shifts landward. This hour produced a high correlation between cells and the mean July maximum temperature. Particularly noticeable is the high concentration from Saucier, Mississippi eastward to just north of Pensacola (Fig. 37). Earlier this "belt" of activity was located farther south in the coastal flatlands. This shift of cell development inland with time was apparent in the various statistical tests as significant hours generally became later with distance inland. The belt of activity may be largely a result of sea breeze convergence, for it extends along the northern Gulf Coast eastward to the Florida peninsula where the Atlantic Ocean and Gulf of Mexico produce a double sea breeze convergence zone (8). In addition to the coastal belt, an active area exists from Lafayette, Louisiana to an area south of Meridian, Mississippi. Much of this area has low maximum temperatures on the ten-year mean map.

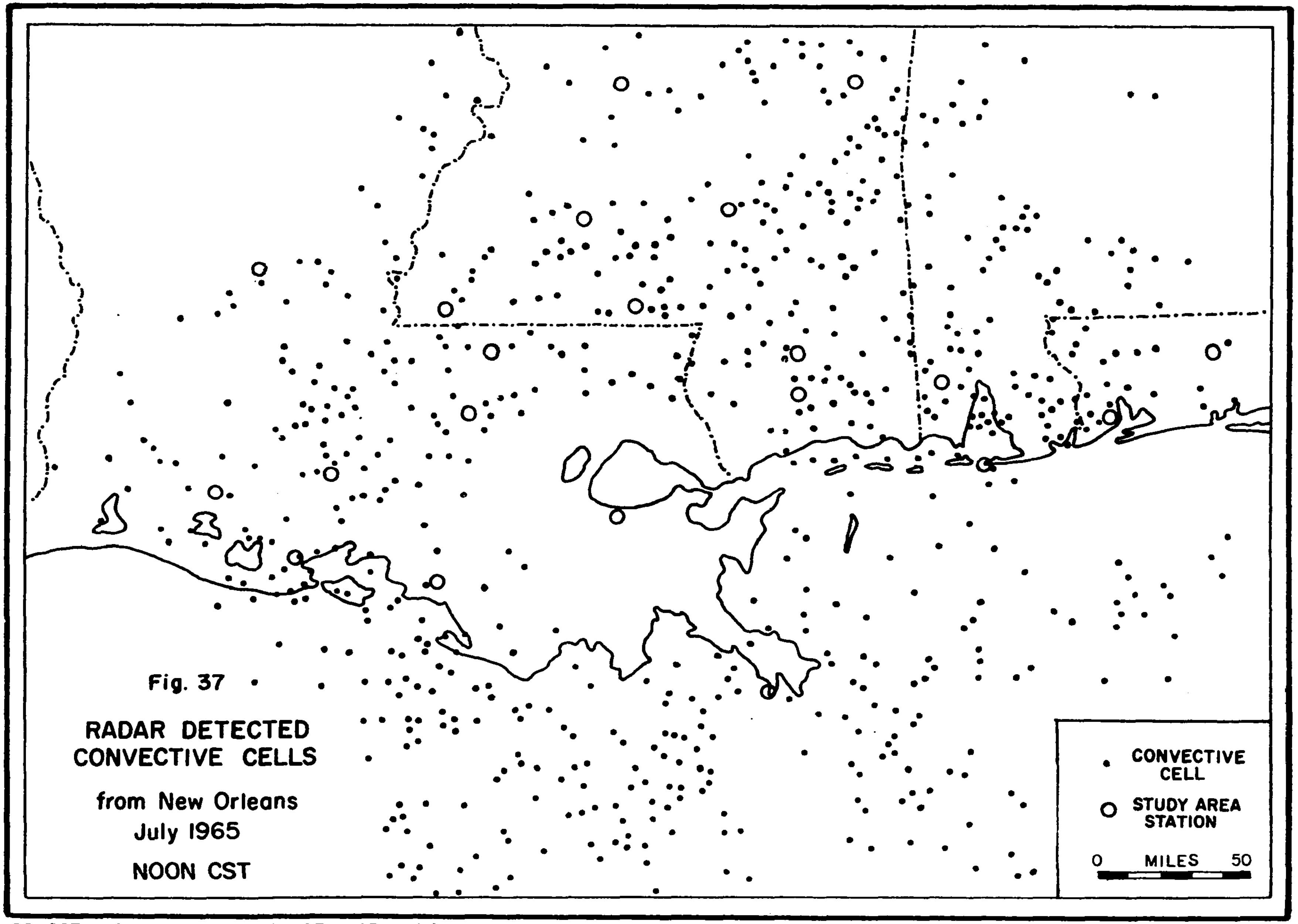


Fig. 37

RADAR DETECTED CONVECTIVE CELLS

from New Orleans
July 1965

NOON CST

SOURCE: NATIONAL WEATHER SERVICE RADAR FILM

Two hours later the effect of intense heating is obvious as the density of cells is extremely high (Fig. 38). From Clinton, Louisiana, through Tylertown and Wiggins, Mississippi, an area of rather high mean July maximum temperatures, cell development is rapid and densities among the highest within the radar coverage area. Along the Alabama and Florida coastline the area of maximum cell development is north of Mobile and Pensacola, although in southeast Mississippi an exceedingly large number of cells are still found in the rolling Pine Hills. Of particular interest is the lack of cells over the immediate coastline and the offshore waters of Mississippi, Alabama and Florida. This is a result of the sea breeze which precludes development by cooling the land surface and creating subsidence offshore.

Apalachicola

At Apalachicola at 10 a.m. cell activity is overwhelmingly predominant over the Gulf of Mexico (Fig. 39). Inland cells are primarily confined between the coastline and 40 miles distance from the coast.

Two hours later cell activity shifts to the land

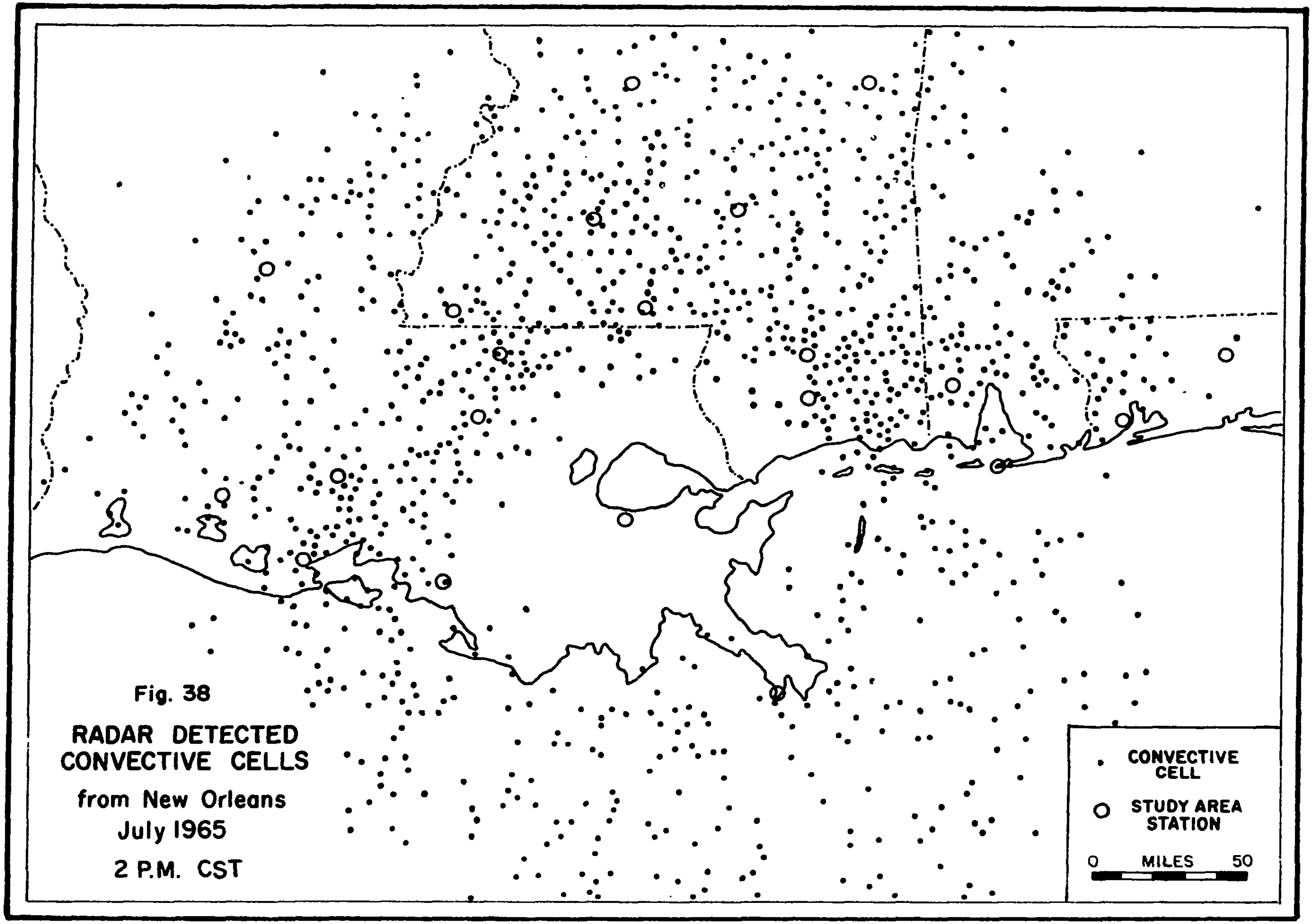


Fig. 38

RADAR DETECTED CONVECTIVE CELLS from New Orleans July 1965 2 P.M. CST

SOURCE: NATIONAL WEATHER SERVICE RADAR FILM

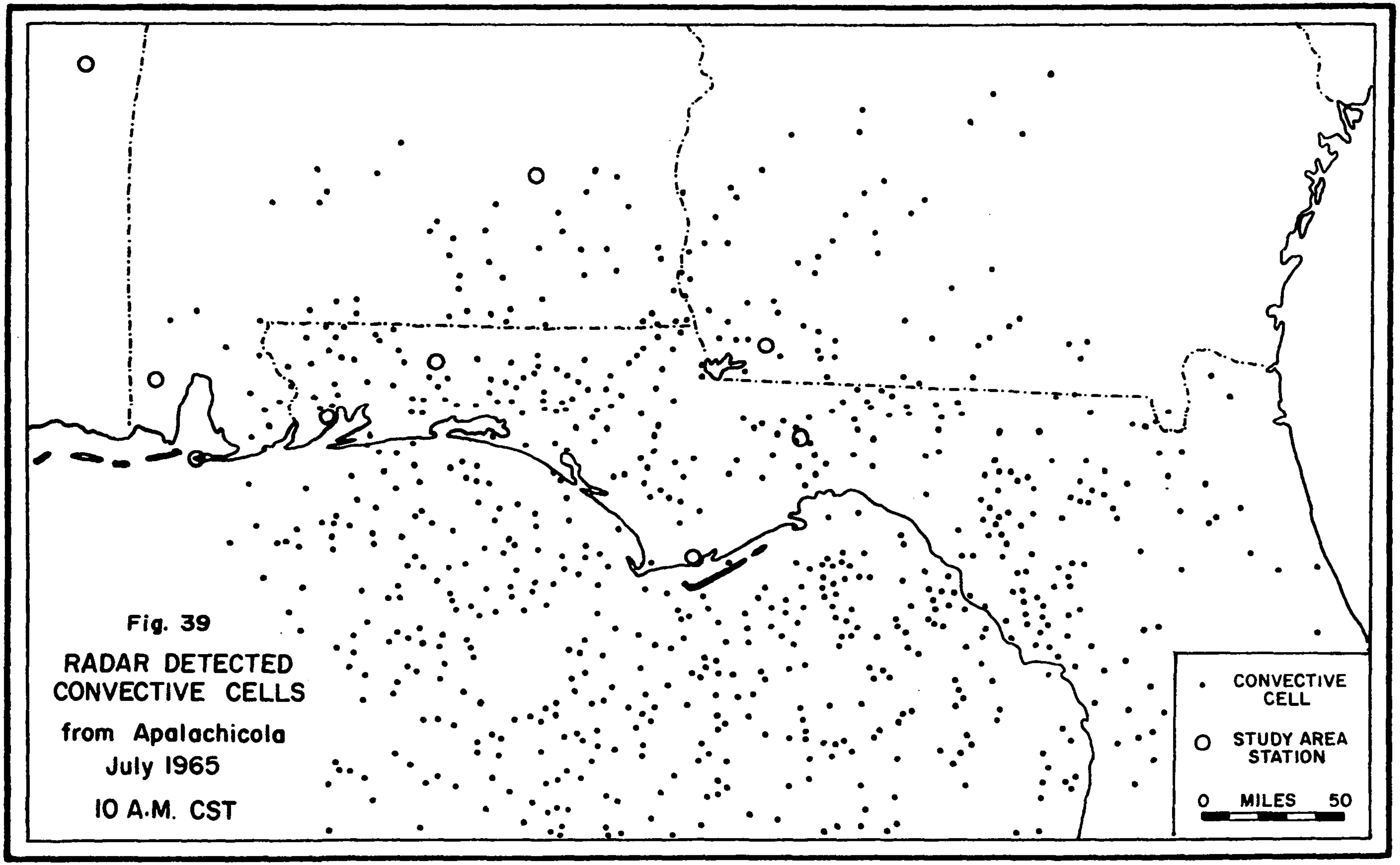


Fig. 39
RADAR DETECTED CONVECTIVE CELLS
from Apalachicola
July 1965
10 A.M. CST

SOURCE: NATIONAL WEATHER SERVICE RADAR FILM

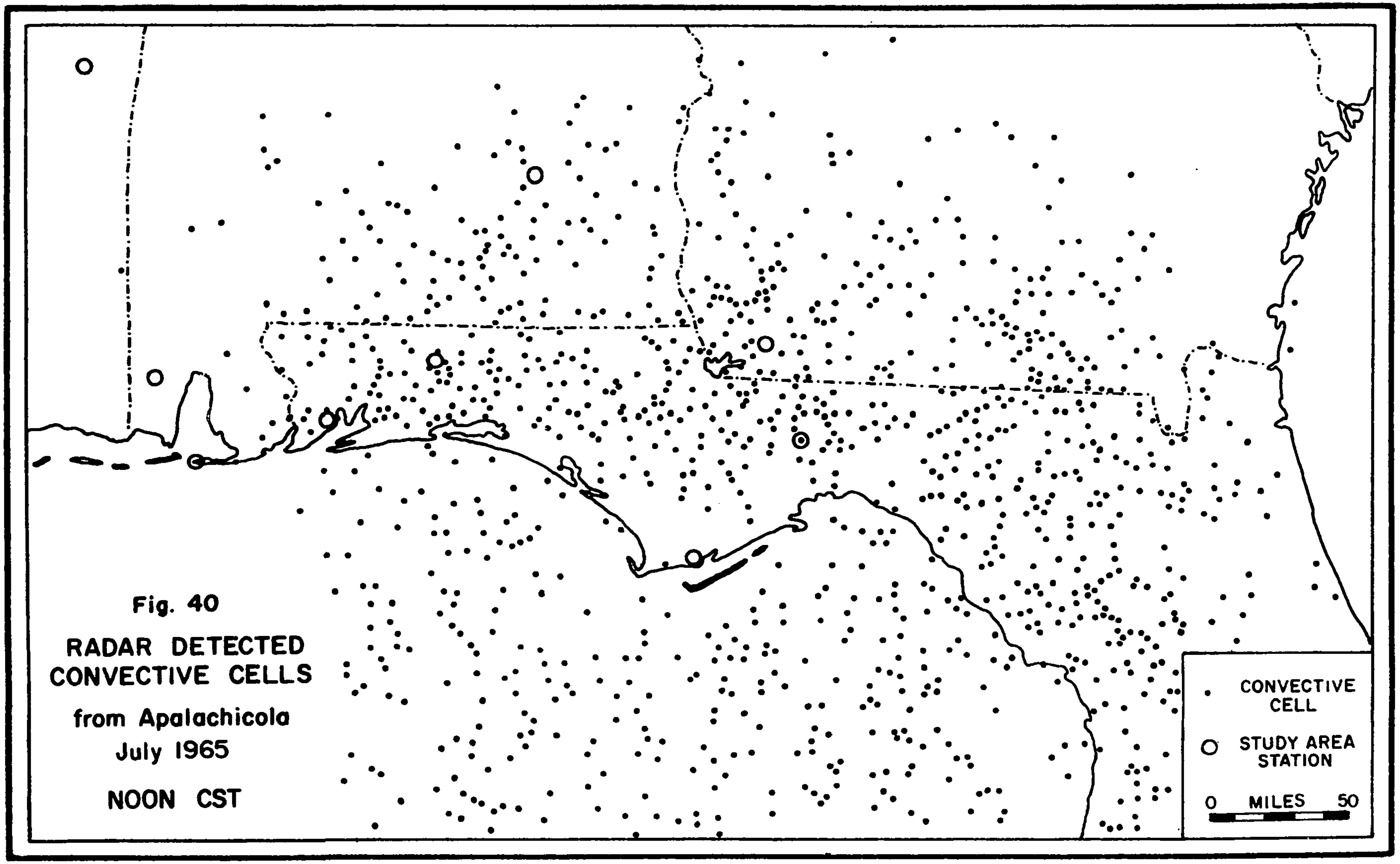


Fig. 40

RADAR DETECTED CONVECTIVE CELLS

from Apalachicola

July 1965

NOON CST

SOURCE: NATIONAL WEATHER SERVICE RADAR FILM

with a "belt" of high density covering the Florida panhandle from Pensacola to Tallahassee (Fig. 40). From 10 a.m. to noon, southeast Alabama and southwest Georgia appear to have had an increase in cell activity as great, if not greater, than the Florida panhandle. Quite noticeable is the sea breeze effect along the entire coast of the panhandle.

At 2 p.m., the land-water contrast is at its height (Fig. 41). The coastal waters are almost devoid of cells, whereas the Florida panhandle and the southern part of Alabama and Georgia show very high cell densities. In fact, there appears to be a slight decline over the Florida panhandle between noon and 2 p.m. as the sea breeze convergence moves northward.

Hour of Occurrence of Convective Rainfall and the Mean 1960-1969 July Maximum Temperature Distribution

Using the hour with significant (t) and significant (r) values for each inland station, a statistically significant inverse relationship was determined between the hour of convective rainfall occurrence and the 1960-1969 mean maximum temperature distribution for July. The ten-year mean July maximum temperature for stations having an hour with both a significant (r)

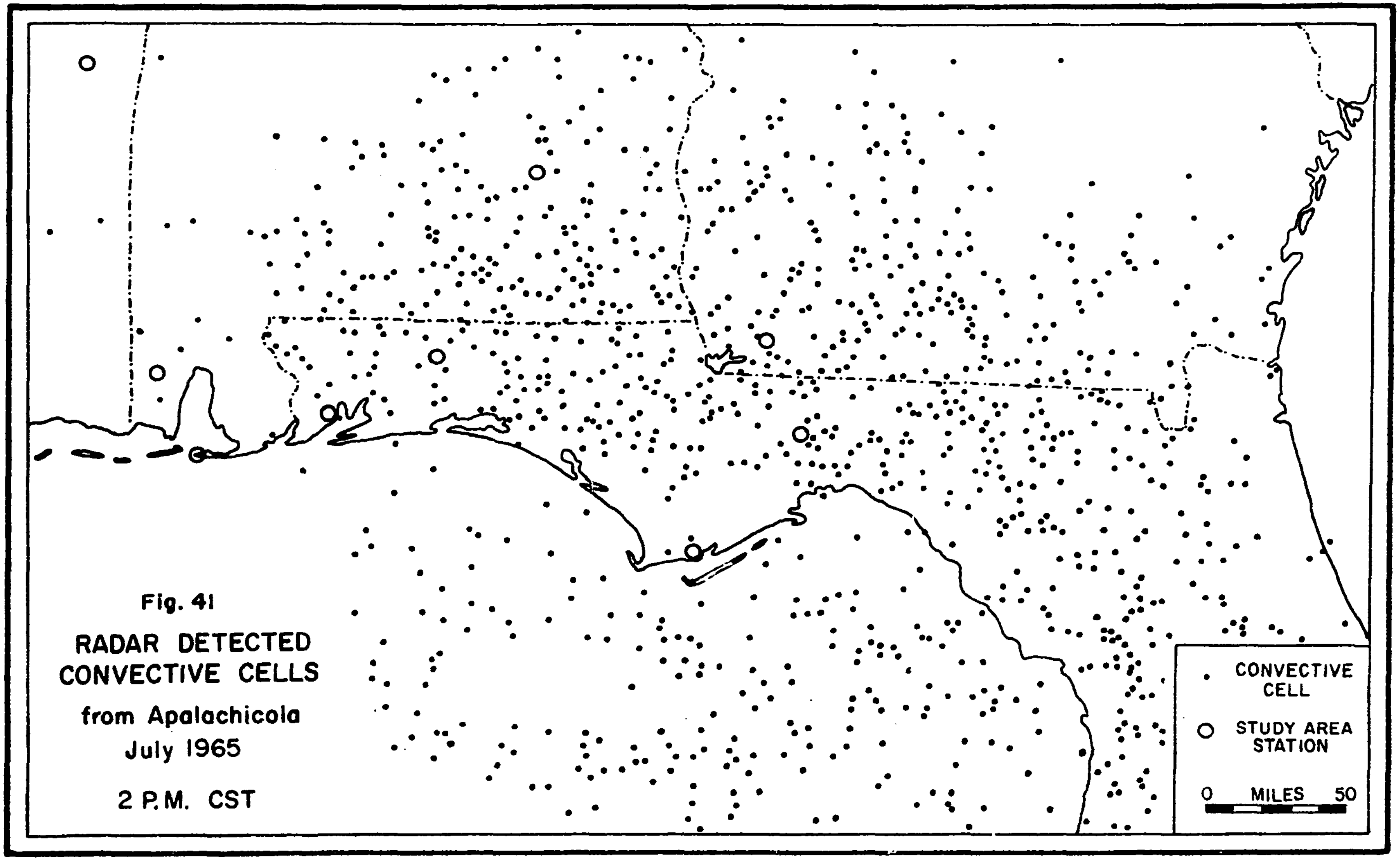


Fig. 41
RADAR DETECTED CONVECTIVE CELLS
from Apalachicola
July 1965
2 P.M. CST

SOURCE: NATIONAL WEATHER SERVICE RADAR FILM

and (t) value was significantly lower than the mean maximum temperature for stations in which (1) the significant (r) and (t) value failedto occur in the same hour, or (2) significant values did not exist. The null hypothesis that there is no significant relationship between convective rainfall and the distribution of mean July maximum temperatures was rejected.

On the map of mean July maximum temperatures for 1960-1969, all of the stations except Troy, Alabama and Lafayette, Louisiana, having a mean maximum temperature less than 92^{o} have a significant (r) and significant (t) value in the same hour. Because their (r) values are close to the 95 per cent level and their (t) values are highly significant, both Troy and Lafayette are considered among those stations having a significant (r) and (t) value in the same hour. Of all the stations meeting these requirements only three have mean maximum temperatures of 92^{o} or higher (Fig. 42).

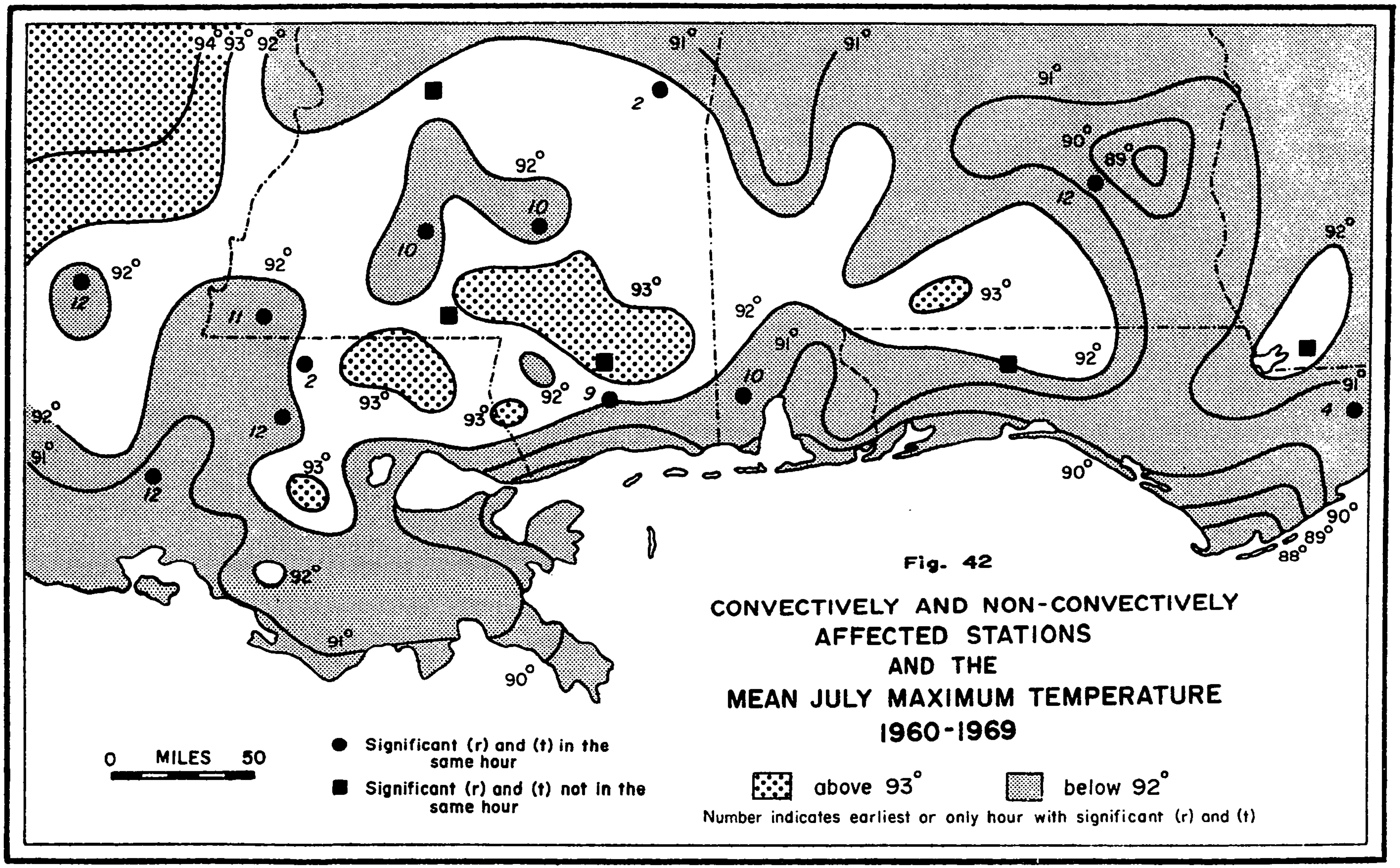


Fig. 42

CONVECTIVELY AND NON-CONVECTIVELY AFFECTED STATIONS AND THE MEAN JULY MAXIMUM TEMPERATURE 1960-1969

SOURCE: *HOURLY PRECIPITATION DATA* AND *CLIMATOLOGICAL DATA*

PART III

SUMMARY AND CONCLUSIONS

CHAPTER VI

SUMMARY

On a map of the mean July maximum temperature for the period 1960-1969, considerable variation exists in the distribution of maximum temperatures over the northern Gulf Coast. Lowest maximum temperatures are found along the immediate coast, but in several locations low maximum temperatures extend well inland. On the other hand, exceptionally warm temperatures are found in several areas quite close to the coast. In addition, the entire region has one of the highest July frequencies of convective rainfall in the United States. Because of the area coincidence of these two factors, and because it has been demonstrated that convective rainfall has a cooling effect on the temperature, it was hypothesized that the maximum temperature is a function of the frequency of convective rainfall. Therefore, the research problem was to determine the relationship between convective rainfall and the distribution of summer maximum temperatures along the northern Gulf Coast.

In order to limit precipitation only to air-mass convective activity it was necessary to choose a time period in which (1) air-mass convective activity was a maximum and

(2) the chances of interference from non-air-mass activity, such as fronts and tropical disturbances, were at a minimum. The month of July best fit this situation.

The research problem was studied by testing a series of hypotheses commencing with the general research hypothesis.

RESEARCH HYPOTHESIS: There is a significant relationship between convective rainfall and the distribution of July mean maximum temperatures.

The validity of the research hypothesis was determined through the comprehensive testing of several supportive hypotheses using the precipitation variables, amount and occurrence.

I. SUPPORTIVE HYPOTHESIS: There is a significant inverse relationship between the amount of convective rainfall and maximum temperatures.

The null hypothesis was tested for each station by correlating the total daily and hourly convective rainfall to the daily maximum temperature, and the monthly total and monthly total by hour of convective rainfall with the mean July maximum temperature.

Low correlations generally resulted from the use of convective rainfall amounts as the independent variable. Whenever rainfall totals for more than one hour were related to the maximum temperature, correlations were low and failed to exhibit a pattern. The correlation of amounts for each hour with the daily maximum temperature produced low correlations, although there was a tendency for the late morning hours to have a slightly higher inverse relationship. However, when the total monthly amount for each hour was correlated with the mean monthly maximum temperature, a slight pattern resulted. This pattern was in the form of high inverse correlations for several stations during the mid afternoon. For the majority of stations, however, the coefficients fluctuated from hour to hour with several instances of the coefficient shifting from negative to positive in the afternoon. The fluctuating nature of amount coefficients was a result of the variable characteristic of convective rainfall, a characteristic that frequently produced enormously different rainfall amounts with the same or similar maximum temperatures.

II. SUPPORTIVE HYPOTHESIS: The hour of occurrence of air-mass convective rainfall has a significant effect on daily maximum temperatures.

The "t" test was used to test the validity of the null hypothesis. Preparation of the data for the test's application involved computation of average maximum temperatures for convective rainfall hours and no-rainfall convective days. Tests were run on measurable and trace occurrences separately and in combination when trace occurrences were available. Only first-order stations were used when traces were tested. For each hour of occurrence of convective rainfall the maximum temperature was recorded and at the end of the month averaged. This procedure was followed for each station and produced the average maximum temperature for convective rainfall hours. Then, for each convective day in which rainfall did not occur, the maximum temperature was noted and averaged at the end of the month. Thus, the "t" test was applied to the average maximum temperature for convective rainfall hours and the average maximum temperature for no-rainfall convective days.

The null hypothesis was rejected for one or more hours for all but three stations when measurable occurrences were tested but, more importantly, definite patterns were established using the occurrence of rainfall as a variable. As was hypothesized, morning rainfall had a significant effect on the daily maximum temperature. Whereas inland the greatest number of most significant (t) values occurred between 10 a.m. and noon, along the coast it was between 9 a.m. and 11 a.m.

When trace occurrences were added to the measurable occurrences, a general increase in the (t) values occurred. The combination of the two types of rainfall measurements produced a more accurate picture of the effects of convective rainfall. Although once again only first order stations were used, they did indicate the importance of morning convective activity on the daily maximum temperature.

III: SUPPORTIVE HYPOTHESIS: The hour of occurrence of air-mass convective rainfall has a significant effect on mean July maximum temperatures.

After determining that the hour of occurrence of convective rainfall had a significant effect on the daily maximum temperature, the number of hours in which rainfall occurred was then correlated with the mean July maximum temperature. Once again, it was necessary to run tests on measurable and trace occurrences separately and in combination.

The resulting coefficients of correlation for measurable occurrences yielded a pattern in which the hour from 11 a.m. to noon had the greatest number of most significant (r) values for each station. However, there were enough stations with most significant (r) values in the afternoon to produce a secondary maximum. High afternoon correlation coefficients were a result not so much of the hour's cooling power as they were of the frequency of convective rainfall. Thus, the variation in frequency of convective rainfall primarily accounted for the variation in the mean July maximum temperature.

Coefficients of correlation determined for hourly amounts in Chapter III were compared to those resulting from the hour of occurrence of convective rainfall. The hour of occurrence produced a higher negative (r) value for 72 per cent of the hours, an indication of its superiority as a variable.

The correlation of hours of trace rainfall with the mean July maximum temperature produced significant (r) values for several stations, primarily between noon and 2 p.m., a period of high trace frequency.

The combination of measurable and trace occurrences, so effective in relating to the daily maximum temperature, increased the (r) values for most hours. The influence of the trace was considerable, as the hours with the greatest effect on the mean maximum July temperature, noon to 2 p.m., were the same as those for trace occurrences. Thus, the trace of convective rainfall was an important variable in establishing convective rainfall and maximum temperature relationships.

Since the trace is the closest recorded climatological indicator of the effect of distant showers, radar was tested to see if it provides a more accurate picture of the effects of remote rainfall. Using radar film from New Orleans and Apalachicola, convective cells were extracted and plotted on radar maps at two-hour intervals. The mean July maximum temperatures for 1965 were correlated with the number of cells within several radii around each station. For the noon distribution of cells, a high correlation was achieved for all radii. A comparative test between radar detected cells and hourly occurrences indicated that radar was considerably more effective. Radar did detect a change from negative to positive correlations between noon and 2 p.m., an indication that cells become a function of the maximum temperature distribution. Having determined the hours for each station which have a significant effect on the daily and monthly mean maximum temperatures, the hourly occurrence was related to the mean maximum July temperature distribution map for 1960-1969.

Using the "t" test, the difference between the mean July maximum temperatures for stations having a significant (t) and (r) value in the same hour, and the mean July maximum temperatures for stations not having this condition of significance was determined and checked for significance at the 95 per cent level.

The mean maximum temperatures for those stations with a significant (t) and (r) in the same hour were significantly lower. Thus, it was concluded that convective rainfall has a significant effect on the distribution of maximum temperatures.

CHAPTER VII

CONCLUSIONS

Obviously convective rainfall affects the maximum temperature along the northern Gulf Coast, but in spite of some of the heaviest summer rainfall in the United States it is apparent that the distribution of maximum temperatures is more a function of the frequency and time of occurrence of convective rainfall. That is, the area has a "convectively controlled" maximum temperature that depends on the number of times convective rainfall occurs during a particular time of day.

Heavy rainfall is an intrinsic characteristic of convective rainfall, but so is variability. It is this latter characteristic which makes the amount of convective rainfall a less effective variable in establishing a relationship between convective rainfall and the maximum temperature. It must be pointed out, however, that for those stations located well inland, monthly total rainfall for the afternoon hours has a significant inverse effect on the mean July maximum temperature.

Subject to less variation, the occurrence of convective rainfall proved to be a more useful variable than the amount. On the basis of statistical testing, there is usually more than one hour in which if it rains the maximum temperature for that day will be significantly lower than the maximum temperature that would be expected if rainfall had not occurred. In coastal areas, this critical period is between 8 a.m. and 10 a.m., whereas inland it is between 10 a.m. and noon. This is an important finding, for although some of the significant hours may not have a high frequency of showers they still have the potential in any given July of having an impact on the mean July maximum temperature if a large number of showers occur.

The extent to which the frequency of occurrence of convective rainfall is a factor in affecting the mean July maximum temperature was determined through additional testing. It was established that there is usually more than one hour that has a significant inverse effect on the mean July maximum temperature, and furthermore that these hours have a high frequency of occurrences of convective rainfall. Although the hour 11 a.m. to noon has a significant effect on the mean July maximum temperature, the afternoon hours, particularly after 2 p.m., significantly affect the mean July maximum, primarily as a result of the high frequency of convective rainfall. Of prime importance, however, is the fact that an hour which significantly affects the mean July maximum temperature is not necessarily one that significantly affects the daily maximum temperature. This is because the retardation of the maximum temperature in the afternoon, although smaller, carries a greater "weight" on a monthly basis, for it occurs numerous times. On the other hand, the greater cooling in the morning hours is not as influential on a monthly basis because of a low frequency of occurrence.

On the mean July maximum temperature map for 1960-1969, areas of low maximum temperature extend well inland from the coast. For a station to have a mean maximum temperature that is lower than surrounding areas, the hours which produce its daily maximum temperature must be influential in determining the mean July maximum temperature. Through testing of the ten-year map, it was established that those stations having significant (r) and (t) values in the same hour have significantly lower mean July maximum temperatures than those stations not having significant (r) and (t) values in the same hour. Thus, there is sufficient evidence to support the research hypothesis that there is a significant relationship between convective rainfall and the distribution of mean July maximum temperatures. On the basis of statistical testing, convective rainfall occurrences during the late morning hours are primarily responsible for producing the low mean July maximum temperatures that appeared on the 1960-1969 map.

Radar was most convincing in determining the relationship of convective activity to the distribution of maximum temperatures. Although only one month was used, the noon distribution of convective rainfall cells produced a high inverse relationship with the mean maximum temperature. Interestingly, between noon and 2 p.m. radar detected a shift to a positive relationship in which convective cells became a function of the maximum temperature distribution. This was an important finding, for it showed that through the use of standard climatological records an overlapping effect was produced. That is, the high inverse relationships in the afternoon were largely due to low maximum temperatures produced by earlier rainfall. The instantaneous nature of radar, however, made it more independent of previous activity. Furthermore, radar's ability to detect distant cells, which normally would not have been recorded, gave it a superior advantage over standard climatological records. Despite numerous problems encountered in the extraction of data, if applied to a study such as this, radar would produce even higher levels of confidence in rejecting the null hypothesis.

Utilizing radar, it should be possible to study in more detail the association between convective rainfall and the maximum temperature by determining: (1) the effect of a single rainfall in a given day at or in close proximity to a station, (2) the area and degree of cooling coincident with cells of various sizes, (3) the characteristics of the sea breeze particularly in areas where the coast is indented with numerous bays, and (4) the effect of a convectively lowered maximum temperature at one station on the maximum temperature of another downwind that is unaffected by rainfall.

As a result of this research, these potential investigations may be conducted during a period of the day which proved critical in retarding the maximum temperature.

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Appendix I

NON-CONVECTIVE DAYS
JULY

Non-Convective Days for Each Year in the Study Period									
1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
4	8	9	9	2	12	1	3	2	17
5	9	10	10	3	13	2	4	3	18
6	10	16	11	6	19	17	5	4	29
7	12	17	12	13	20	20	14	9	
8	16	18	22	14		21	17	10	
9		19		17		22	18	11	
14		24		18		25		20	
15		25		19		26			
16		26				31			
17		27							
18		28							
27									
28									

Source: Daily Weather Map, U.S. Weather Bureau

Appendix II

TOTAL JULY CONVECTIVE RAINFALL AND THE MEAN JULY MAXIMUM TEMPERATURE

Station	1960		1961		1962		1963		1964		1965	
	P	T	P	T	P	T	P	T	P	T	P	T
Alexandria	0.59	94.0	3.31	87.9	0.91	93.8	1.56	92.1	1.66	89.4	1.31	93.8
Apalachicola	2.68	88.0	1.46	87.9	0.15	89.7	7.11	87.0	3.14	86.5	3.44	88.5
Baton Rouge	2.67	96.4	4.39	88.0	0.98	93.6	4.15	91.6	3.53	89.8	2.91	91.5
Jackson	0.22	95.7	2.75	88.4	0.15	95.0	4.33	91.2	0.89	90.7	0.52	93.3
Meridian	0.02	96.0	1.58	90.0	2.24	97.2	1.60	91.3	1.60	89.7	2.11	90.5
Mobile	2.51	92.2	2.62	90.0	0.60	93.3	4.67	91.5	1.86	89.0	5.74	91.0
New Orleans	0.01	94.1	2.42	88.5	0.12	92.8	4.42	89.5	0.97	89.0	4.09	89.6
Pensacola	2.09	90.7	0.95	88.6	5.36	91.2	3.23	87.9	3.98	88.3	3.07	88.5
Tallahassee	1.98	89.7	3.43	90.5	1.25	92.5	3.85	90.8	7.21	88.8	3.17	90.8

P = Total Convective Precipitation - July

T = Mean Maximum Temperature - July

Calculated from Local Climatological Data

Appendix II - continued

Station	1966		1967		1968		1969	
	P	T	P	T	P	T	P	T
Alexandria	1.28	94.1	2.01	88.6	0.98	91.5		
Apalachicola	4.98	86.3	4.32	87.9	5.33	88.5		
Baton Rouge	0.78	91.9	7.30	89.4	3.02	91.6	5.24	91.8
Jackson	1.45	94.2	1.62	87.1	0.15	91.7	1.57	93.9
Meridian	0.27	93.9	2.02	88.7	1.10	92.0	2.31	93.4
Mobile	0.42	93.1	5.87	90.5	1.22	92.4	6.25	91.5
New Orleans	3.30	91.9	4.88	89.5	3.79	91.2	3.29	90.6
Pensacola	2.40	90.4	3.26	87.4	0.83	88.9		
Tallahassee	3.46	92.9	6.36	89.8	1.83	91.9	11.11	91.0

P = Total Convective Precipitation - July

T = Mean Maximum Temperature - July

Calculated from Local Climatological Data

Appendix III

DAILY TOTAL CONVECTIVE RAINFALL AND THE DAILY MAXIMUM TEMPERATURE - Baton Rouge, Louisiana

1960		1961		1962		1963		1964		1965		1966		1967		1968		1969	
P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T
0	95	0	87	.15	88	.25	92	.88	90	0	92	0	88	.19	94	0	94	0	99
0	99	1.20	85	0	90	0	91	0	89	0	93	.49	89	.15	90	0	90	0	96
0	98	.10	86	0	92	0	92	0	94	.03	91	.07	86	.45	85	0	93	.01	99
0	98	0	88	0	93	0	95	0	93	0	93	0	92	.58	83	0	92	.11	98
0	97	0	90	0	93	0	92	0	94	.01	90	0	93	0	93	0	93	.26	95
.05	101	0	89	0	92	0	95	0	86	0	86	0	95	0	91	.61	91	0	92
1.25	98	0	90	0	93	0	95	0	91	.54	89	0	95	0	92	0	91	0	97
1.07	92	0	90	0	93	0	94	.05	92	.03	90	0	93	2.40	91	0	94	0	97
0	94	0	88	0	95	.02	90	0	92	0	89	0	93	.17	88	0	94	0	97
0	96	0	90	0	95	0	94	0	90	0	92	0	93	1.96	84	0	94	3.82	82
0	97	0	89	.09	93	.13	91	.03	90	.55	92	0	94	0	82	.10	93	.12	88
0	95	0	90	.03	93	.05	92	0	90	.30	85	.01	92	0	85	1.49	90	0	93
0	93	0	92	0	93	0	95	0	92	.01	90	0	94	.57	87	.10	90	0	94
0	94	0	91	.71	96	0	94	0	92	0	91	.11	94	0	88	.12	86	0	96
0	95	0	89	0	96	0	93	0	92	.01	91	0	94	.07	88	.14	85	0	94
0	95	.06	86	0	95	0	93	.49	91	0	92	0	91	.02	89	.37	85	0	91
0	95	.03	88	0	94	0	93	.67	91	0	93	0	91	0	91	0	92	.12	80
.03	95	0	92	0	93	0	90	0	91	0	93	0	94	0	91	0	93	0	88
		0	92	0	93	0	87	.90	91	0	93	0	92	0	91	0	93	0	92
		.21	93	0	96	.05	86	0	83	0	93	0	93	0	92	0	92	.21	88
		.03	90			.05	87	.51	87	0	93	.10	92	0	92	0	93	.10	84
		0	89			.01	90	0	91	.05	92			0	93	0	94	.45	90
		.61	87			0	92	0	91	0	94			0	90	0	94	.02	91
		1.14	83			.48	90			0	93			0	92	0	93	0	93
		0	87			.51	90			.64	93			0	93			0	92
						0	91			.74	91							0	91
										0	91							0	91
										0	94							0	91

Appendix III - continued

DAILY TOTAL CONVECTIVE RAINFALL AND THE DAILY MAXIMUM TEMPERATURE - Pensacola, Florida

1960		1961		1962		1963		1964		1965		1966		1967		1968	
P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T
0	89	0	86	0	88	0	87	.18	89	0	93	.02	89	0	91	0	92
0	91	0	90	0	89	0	90	0	88	.01	89	.01	89	0	91	.05	88
0	96	0	91	0	89	0	93	0	92	.05	88	1.09	87	1.05	87	0	85
.49	90	.44	81	.02	94	0	89	0	91	0	88	0	93	0	88	0	88
1.05	85	.25	85	1.13	92	0	92	0	91	0	91	.27	93	.25	88	.01	85
0	89	0	90	0	88	0	94	0	90	.24	89	0	97	.01	87	.38	88
0	89	0	89	.67	85	0	94	.02	92	.01	90	0	90	.53	85	.12	87
.01	91	0	89	0	95	.04	92	.64	89	.13	84	0	89	0	89	0	89
.08	95	0	89	0	91	0	86	.07	88	.03	85	0	91	0	91	0	89
0	94	0	89	1.76	93	.36	88	0	88	0	88	0	91	.01	88	0	88
0	91	.14	89	0	89	0	89	0	89	.04	87	0	93	.01	85	0	89
0	92	.02	89	0	94	0	87	.10	87	.09	83	.90	94	.51	79	0	86
0	94	0	93	.32	87	0	87	.41	90	0	89	0	89	0	84	0	88
0	93	0	89	0	91	0	87	1.01	88	.04	90	0	91	0	86	.04	90
0	97	.10	88	0	97	0	89	.34	86	0	93	0	89	.33	85	0	88
0	93	0	89	.83	94	.10	91	.27	90	0	94	0	91	0	89	0	89
.46	90	0	89	0	90	0	91	.36	89	0	88	0	88	.06	89	0	89
0	85	0	89	.05	89	.03	88	0	87	0	88	0	92	0	91	0	92
		0	92	.52	88	2.34	82	.02	85	0	91	0	90	0	92	0	95
		0	92	0	92	.12	82	.56	87	0	89	0	91	0	90	0	95
		0	90			.03	80	0	89	0	88	.08	91	0	90	0	96
		0	89			0	85	0	90	.66	89	.02	93	.16	88	.23	93
		0	89			0	88	0	90	.70				.34	87	0	93
		0	90			0	87			0	87					0	92
		0	92			0	88			1.03	84						
						.23	85			0	84						
										.04	85						

P = Daily Total Precipitation
T = Daily Maximum Temperature

Source: Local Climatological Data

Appendix IV

Total Convective Rainfall by Hour and the Mean July Maximum Temperature

Station	Year	Mean Maximum Temperature	Total Precipitation by Hour A.M. 8-9	9-10	10-11	11-12	12-1	P.M. 1-2	2-3	3-4
Alexandria	1960	87.9		0	0	.34	0	.05	.35	.19
	1961	94.0		0	0	0	.53	.70	.70	1.04
	1962	93.8		0	0	0	0	.78	.12	.01
	1963	92.1		.45	.05	.01	0	.03	.28	.74
	1964	89.4		.16	.01	1.07	.25	0	0	.17
	1965	93.8		0	0	.08	.05	.50	.18	.50
	1966	94.1		0	0	.60	0	.04	.18	.46
	1967	88.6		.03	.09	.07	.04	.78	.34	.14
	1968	91.5		.01	0	.09	.01	.14	.60	.07
Apalachicola	1960	88.0		.25	.04	.45	.46	.95	.07	.27
	1961	87.9		.03	.06	.05	.36	.96	0	0
	1962	89.7		.06	.02	.06	0	0	0	0
	1963	87.0		.74	.41	.67	.21	1.49	.75	1.04
	1964	86.5		.25	.35	.69	.12	.12	.83	.03
	1965	88.5		.34	.51	.26	.09	.05	0	.17
	1966	86.3		.06	1.02	.20	.58	.49	1.28	.66
	1967	87.9		.14	.26	.99	0	0	.21	.15
	1968	88.5		.48	1.35	.92	1.78	.45	.05	.01
Baton Rouge	1960	96.4	0	0	0	0	0	1.00	.60	1.07
	1961	88.0	0	0	0	2.43	.74	.23	.45	.54
	1962	93.6	0	0	0	0	.03	.11	.15	.72
	1963	91.6	0	.05	0	0	.63	.98	2.18	.31
	1964	89.8	0	0	0	.10	.72	1.25	.40	1.06

Appendix IV - continued

Total Convective Rainfall by Hour and the Mean July Maximum Temperature

Station	Year	Mean Maximum Temperature	Total Precipitation by Hour A.M. 8-9	9-10	10-11	11-12	12-1	P.M. 1-2	2-3	3-4
Baton Rouge (Cont'd)	1965	91.5	0	0	.02	.55	.98	.11	.45	.90
	1966	91.9	0	.03	.07	.01	.44	.02	.05	.16
	1967	89.4	.04	.42	.45	.87	1.09	.95	3.13	.35
	1968	91.6	0	0	.37	.11	.06	2.14	.21	.13
	1969	91.8	2.58	.35	.33	.27	.80	.14	.21	.56
Jackson	1960	95.7	0	.03	0	0	0	0	0	.22
	1961	88.4	0	0	0	0	0	.80	1.47	.48
	1962	95.0	0	0	0	0	0	0	.15	0
	1963	91.2	.46	0	2.11	.31	.78	.27	.06	.01
	1964	90.7	.14	.33	.10	0	0	0	0	.58
	1965	93.5	0	.07	0	0	0	.05	.05	.42
	1966	94.2	.01	0	.04	.01	0	.04	0	0
	1967	87.1	.08	1.35	.46	.10	.01	0	.25	.60
	1968	91.7	0	.12	0	.03	.04	0	.04	.04
	1969	93.9	.12	0	.05	.20	.70	.11	.29	.07
Meridian	1960	96.0	0	.02	0	0	0	0	0	0
	1961	90.0	0	0	0	.49	.24	.05	.50	.30
	1962	97.2	0	0	.10	.06	.10	0	1.94	.04
	1963	91.3	0	.23	.03	.04	.02	.15	.88	.25
	1964	89.7	.12	.06	0	1.07	.03	.04	.22	.06
	1965	90.5	0	0	.05	.05	.02	1.43	.53	.03
	1966	93.9	.09	.02	.09	.03	.02	0	0	.02
	1967	88.7	.09	.04	.02	.05	.26	.15	.86	.55
	1968	92.0	0	0	0	.62	0	.01	.26	.21
	1969	93.4	.09	.11	.25	.47	.32	.04	1.00	.03

Appendix IV - continued

Total Convective Rainfall by Hour and the Mean July Maximum Temperature

Station	Year	Mean Maximum Temperature	Total Precipitation by Hour							
				A.M.				P.M.		
			8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4
Mobile	1960	92.2	0	0	0	0	0	.38	1.89	.24
	1961	90.0	.01	.18	.23	0	.72	.51	.89	.08
	1962	93.3	0	0	.02	.18	0	.02	.15	.23
	1963	91.5	.15	.03	.07	.23	.81	2.07	1.17	.14
	1964	89.0	0	.17	.01	.03	.06	.23	.93	.43
	1965	91.0	1.63	.45	.34	.04	.08	1.01	1.59	.60
	1966	93.1	0	0	0	.05	0	0	.10	.27
	1967	90.5	.66	1.31	.18	1.14	.21	.31	.99	1.07
	1968	92.4	0	0	.60	.50	0	.03	.09	0
	1969	91.5	.08	.12	0	.26	3.42	1.45	.31	.61
New Orleans	1960	94.1	0	0	0	0	0	0	0	.01
	1961	88.5	0	0	0	0	0	.61	1.55	.26
	1962	92.8	0	0	0	0	0	0	.12	0
	1963	89.5	.01	.02	.41	.19	1.34	2.03	.40	.02
	1964	89.0	.07	.03	.15	.04	.45	.02	.07	.14
	1965	89.6	.17	.02	.03	.05	.36	2.18	.69	.59
	1966	91.9	1.71	.40	.25	.27	.55	.02	.05	.05
	1967	89.5	.15	.25	.60	.41	.50	.89	.60	1.48
	1968	91.2	0	.04	.01	1.01	1.26	.68	.67	.12
	1969	90.6	0	0	.28	.86	.91	.24	.51	.49

Appendix IV - continued

Total Convective Rainfall by Hour and the Mean July Maximum Temperature

Station	Year	Mean Maximum Temperature	Total Precipitation by Hour A.M. 8-9	9-10	10-11	11-12	12-1	P.M. 1-2	2-3	3-4
Pensacola	1960	90.7	0	.44	.57	.77	0	.23	0	.08
	1961	88.6	0	.49	.28	.02	.16	0	0	0
	1962	91.2	0	.22	0	.04	2.43	.88	.71	1.08
	1963	87.9	.01	.15	.05	.14	.53	1.87	.13	.37
	1964	88.3	.02	.58	.14	.74	.28	.55	.68	.99
	1965	88.5	.15	.07	.01	.80	.79	.59	.52	.14
	1966	90.4	.02	.52	.58	0	.08	.76	.36	.08
	1967	87.4	.45	.81	1.39	.37	.10	.01	.13	0
	1968	88.9	.05	.01	0	.11	.64	.02	0	0
Tallahassee	1960	89.7	0	0	.10	.03	.06	1.23	.21	.44
	1961	90.5	0	0	0	.01	.92	.40	1.97	.13
	1962	92.5	0	0	.06	.14	.21	.03	.75	.06
	1963	90.8	1.18	.29	.41	.29	.77	.07	.62	.22
	1964	88.8	.10	.40	.09	.02	.29	1.87	.89	3.55
	1965	90.8	0	0	1.39	.68	.45	.30	.26	.09
	1966	92.9	.47	.67	.09	.02	0	.15	.67	1.39
	1967	89.8	.03	0	.24	.93	1.91	1.66	1.44	.15
	1968	91.9	0	0	0	.26	.17	.88	.06	.46
	1969	91.0	.47	.12	.37	.90	1.94	4.41	2.10	.80

Appendix V

HOURLY PRECIPITATION AMOUNTS AND THE DAILY MAXIMUM TEMPERATURE, JULY 1965

Baton Rouge, Louisiana

Maximum Temperature for Convective days	Hour Ending at: A.M. 9	10	11	12	P.M. 1	2	3	4
92								
93								
91							.03	
93								
90					.01			
89								
89				.50	.01	.03		
90						.02		.01
89								
92								
92								
85			.02	.05	.23			
90								.01
91							.01	
92								
93								
93								
93								
93								
92						.05		
94								

Appendix V (continued)

Baton Rouge

	Hour Ending at:							
		A.M.				P.M.		
	9	10	11	12	1	2	3	4
93								
93					.63	.01		
91							.41	.33
91								
94								

Pensacola, Florida

	9	10	11	12	1	2	3	4
93								
89				.01				
88				.05				
88								
91								
89				.22	.02			
90							.01	
84	.08	.01			.01	.03		
85	.02	.01						
88								
87	.01				.03			
83	.04	.04	.01					
89								
90								.04
93								

Appendix V (continued

Pensacola, Florida

	Hour Ending at:							
		A.M.					P.M.	
	9	10	11	12	1	2	3	4
94								
88								
88								
91								
89								
88								
89		.01			.51	.14		
85			.52		.18			
87								
84						.42	.47	.14
84								
85					.04			

Appendix VI

AVERAGE MAXIMUM TEMPERATURES FOR CONVECTIVE RAINFALL AND NO-RAINFALL DAYS

Stations	Year	Average Maximum Temperature: No-Rainfall Days	Average Maximum Temperature: Non-measurable Days	Average Maximum Temperature for Days with Convective Rainfall Occurrences: A.M. 8 - 9 M	8 - 9 T	8 - 9 MT	9 - 10 M	9 - 10 T	9 - 10 MT	10 - 11 M	10 - 11 T	10 - 11 MT	A.M. 11 - 12 M	11 - 12 T	11 - 12 MT
Alexandria	1960	94.9	95.1												
	1961	90.9	90.0					84.0	84.0		87.0	87.0	88.0	84.0	87.0
	1962	94.1	94.1												
	1963	93.9	93.4		85.0	85.0	85.0		85.0	85.0		85.0	85.0		85.0
	1964	91.1	90.9		91.0	91.0	91.0	91.0	91.0	91.0	87.0	88.3	84.3		84.3
	1965	93.9	93.9					92.0	92.0		94.0	94.0	88.0	91.0	89.5
	1966	94.7	94.7										89.0	92.0	90.5
	1967	92.4	91.0	79.0	86.0	83.7	79.0	83.0	82.2	82.5	79.0	81.3	83.0	78.0	81.3
	1968	92.6	92.7	79.0		79.0	79.0		79.0	79.0		79.0	79.0		79.0
	1969														
Apalachicola	1960	89.6	88.5	88.0	82.0	86.0	85.0	84.5	84.7	85.0	89.0	87.0	87.0	89.0	87.7
	1961	89.0	89.1				85.0		85.0	85.0		85.0	86.0		86.0
	1962	89.6	89.5	84.0	89.0	86.5	84.0		84.0	86.5		86.5	87.0	84.0	85.5
	1963	88.5	88.4	82.5	86.5	84.5	83.3	87.0	84.3	83.7	86.0	84.8	84.5	87.0	85.0
	1964		87.1												
	1965	88.4	88.1	83.0	78.0	82.0	81.3	85.0	82.5	80.7	83.0	81.3	80.5	85.0	81.4
	1966	89.7	89.7	82.0		82.0	85.0	89.5	87.3	87.8		8.78	87.0	88.5	87.8
	1967	87.1	87.4	84.7		84.7	83.0	85.0	84.3	85.8		85.8	84.5	86.0	85.4
	1968	89.3	89.5	83.0	91.0	85.7	83.0		83.0	83.0		83.0	83.0		83.0
	1969	90.8	90.8	84.4		84.4	85.0	86.0	85.1	84.2	86.3	84.9	85.9	88.0	86.1

Appendix VI (continued)

Stations	Year	Average Maximum Temperature: No-Rainfall Days	Average Maximum Temperature: Non-Measurable Days	A.M. 8 - 9 M	T	MT	9 10 M	T	MT	10 - 11 M	T	MT	A.M. 11 - 12 M	T	MT
				Average Maximum Temperature for Days with Convective Rainfall Occurrences											
Bainbridge	1960														
	1961		93.7												
	1962		97.1										96.0		96.0
	1963		96.0	84.7		84.7	84.7		84.7	83.5		83.5	84.5		84.5
	1964		90.0	94.0		94.0							85.0		85.0
	1965		90.5										83.0		83.0
	1966		95.7	89.0		89.0	89.0		89.0	89.0		89.0	89.0		89.0
	1967		91.1							88.5		88.5	88.0		88.0
	1968		94.2				88.0		88.0	88.0		88.0			
	1969		96.6	86.0		86.0	84.5		84.5	84.5		84.5	83.0		83.0
Baton Rouge	1960	95.9	95.8											83.0	93.0
	1961	89.8	89.7										85.3	86.0	85.5
	1962	93.5	93.5												
	1963	92.9	92.6		88.5	88.5	87.0		87.0					92.0	92.0
	1964	91.4	90.5		83.0	83.0		86.5	86.5		83.0	83.0	90.0	89.0	89.2
	1965	92.5	92.2							85.0	90.0	88.8	87.0	90.0	88.5
	1966	93.1	92.4				92.0		92.0	92.0	90.0	90.7	92.0	87.0	88.7
	1967	91.6	91.1	84.0		84.0	84.0		84.0	86.0		86.0	86.8	83.0	86.2
	1968	92.9	92.9		91.0	91.0		88.0	88.0	85.5	87.5	86.5	85.0	85.5	85.3
	1969	93.6	93.6	83,0	80.0	82.0	81.0	84.0	82.0	83.3		83.3	83.3		83.3
Brookhaven	1960		94.8												
	1961		89.6												
	1962		95.2												
	1963		90.3												
	1964		90.3	86.0		86.0	85.5		85.5	85.5		85.5	85.5		85.5
	1965		91.6										89.0		89.0
	1966		94.1												
	1967		88.5	83.3		83.3	85.0		85.0	84.5		84.5	84.5		84.5
	1968		90.3	85.0		85.0		85.0		85.0		85.0	87.5		87.5
	1969		92.8												

Appendix VI (continued)

Stations	Year	Average Maximum Temperature		Average Maximum Temperature for Days with Convective Rainfall Occurrences											
				A.M. 8 - 9			9 - 10			10 - 11			A.M. 11 - 12		
		No-Rain-fall Days	Non-measurable Days	M	T	MT	M	T	MT	M	T	MT	M	T	MT
Burrwood	1960		93.2	89.6		89.0	89.0		89.0	87.0		87.0	87.0		87.0
	1961		88.1				86.0		86.0	85.7		85.7	85.7		85.7
	1962		89.5	86.7		86.7	86.7		86.7	87.0		87.0	87.0		87.0
	1963		89.4	87.5		87.5	85.8		85.8	86.3		86.3	86.5		86.5
	1964		87.5	83.0		83.0	86.0		86.0	86.0		86.0	86.0		86.0
	1965		89.7	85.0		85.0	82.3		82.3	85.8		85.8	85.5		85.5
	1966		89.6	80.0		86.0	86.0		86.0	86.0		86.0	80.0		80.0
	1967		90.9	90.5		90.5									
Clinton	1960		99.6												
	1961		92.6							83.0		83.0	89.3		89.3
	1962		96.1												
	1963		92.8												
	1964		91.5							88.0		88.0	88.0		88.0
	1965		94.0							91.0		91.0			
	1966		90.5	86.3		86.3	83.7		83.7	83.7		83.7	86.0		86.0
	1967		91.6										86.0		86.0
	1968		95.3	82.7		82.7	85.5		85.5	86.3		86.3	86.4		86.4
Collins	1960		97.2							97.0		97.0	97.0		97.0
	1961		90.6										89.0		89.0
	1962		95.6												
	1963		91.8							90.0		90.0	90.0		90.0
	1964		89.7	86.0		86.0	85.5		85.5	85.5		85.5	85.5		85.5
	1965		91.2				83.0		83.0	83.0		83.0	85.3		85.3
	1966		94.4	89.0		89.0	89.0		89.0	89.0		89.0	89.0		89.0
	1967		88.5	86.0		86.0	85.7		85.7	82.5		82.5	85.0		85.0
	1968		92.4												
	1969		94.8				85.0		85.0	85.0		85.0	85.0		85.0

Stations	Year	Average Maximum Temperature: No-Rainfall Days	Average Maximum Temperature: Non-Measurable Days	A.M. 8 - 9: M	T	MT	9 - 10: M	T	MT	10 - 11: M	T	MT	A.M. 11 - 12: M	T	Mt
Crestview	1960		92.5									91.5	91.5		91.5
	1961														
	1962		93.0	8.20		8.20	83.7		83.7	87.5		87.5	88.8		88.8
	1963		91.4				91.0		91.0	83.0		83.0	82.5		82.5
	1964		91.3	83.3		83.3	84.0		84.0				89.7		89.7
	1965		93.1										88.0		88.0
	1966		91.3	91.0		91.0	91.5		91.5	90.5		90.5	91.5		91.5
	1967		92.8				95.0		95.0	95.0		95.0	95.0		95.0
	1968		94.4	91.0		91.0				90.5		90.5	91.3		91.3
Ft. Morgan	1960		91.9										89.5		89.5
	1961														
	1962		91.0										89.0		89.0
	1963														
	1964		88.4	88.5		88.5	89.0		89.0						
	1965		87.2	85.7		85.7	85.0		85.0	86.4		86.4	86.0		86.0
	1966		87.7	87.0		87.0	87.5		87.5	87.5		87.5	89.0		89.0
	1967		87.8	86.3		86.3	88.0		88.0	90.0		90.0			
	1968		90.9	88.5		88.5	90.0		90.0	87.0		87.0			
	1969		90.2	84.0		84.0	84.0		84.0						
Jackson	1960	96.9	96.9		96.0	96.0									
	1961	90.7	90.4		89.0	89.0								88.7	88.7
	1962	95.7	95.6												
	1963	92.1	92.2	81.0	91.0	86.0	86.0	93.0	88.3	81.0	89.3	87.3	81.0		81.0
	1964	92.5	92.3	85.0		85.0	86.0	86.5	86.3	86.0	89.0	87.5		90.0	90.0
	1965	93.4	93.2												
	1966	95.8	95.8	82.0		82.0	82.0		82.0	82.0		82.0	82.0		82.0
	1967	89.4	88.5	79.0	82.5	81.3	83.3	79.0	82.3	83.3	79.0	82.3	82.0	79.3	82.8
	1968	92.4	92.3										89.0		89.0
	1969	95.8	95.9	87.0		87.0	87.0	84.0	85.5	87.3		87.3	88.3	89.0	88.6

Appendix VI (continued)

Stations	Year	Average Maximum Temperature: No-Rainfall Days	Average Maximum Temperature: Non-Measurable Days	Average Maximum Temperature for Days with Convective Rainfall Occurrences, A.M. 8 - 9: M	8 - 9: T	8 - 9: MT	9 - 10: M	9 - 10: T	9 - 10: MT	10 - 11: M	10 - 11: T	10 - 11: MT	A.M. 11 - 12: M	11 - 12: T	11 - 12: MT
Lafayette	1960		96.2												
	1961		92.8	88.0		88.0				86.0		86.0	86.5		86.5
	1962														
	1963		91.7	89.0		89.0	89.0		89.0	89.0		89.0	90.0		90.0
	1964		89.9	76.0		76.0	76.0		76.0	77.0		77.0	79.7		79.7
	1965		89.9				86.0		86.0	87.0		87.0	89.0		89.0
	1966		89.7	82.0		82.0	83.0		83.0						
	1967		89.3	82.5		82.5	80.0		80.0	86.0		86.0	83.2		83.2
	1968		89.9				84.0		84.0	84.0		84.0	84.0		84.0
	1969		93.2	92.0		92.0	88.0		88.0	84.0		84.0	84.0		84.0
Lake Arthur	1960		93.5				94.0		94.0	94.0		94.0			
	1961		88.1	90.0		90.0	90.0		90.0				86.0		86.0
	1962		93.0												
	1963		89.5	91.0		91.0	89.0		89.0	89.0		89.3	89.3		89.3
	1964		90.5	85.3		85.3	86.3		86.3	87.5		87.5	88.0		88.0
	1965		92.1				89.0		89.0	89.5		89.5	90.0		90.0
	1966		90.0	90.2		90.2	90.2		90.2	95.0		95.0	91.6		91.6
	1967		88.2	90.3		90.3	90.3		90.3	87.6		87.6	85.8		85.8
	1968														
	1969		92.1												
Meridian	1960	97.5	97.6				97.0		97.0						
	1961	91.4	91.2										90.3	88.0	89.8
	1962	97.7	97.9							92.0		92.0	96.0	92.0	94.0
	1963	92.7	92.1		83.0	83.0	90.0		90.0	90.0	87.5	88.3	90.0	90.5	90.3
	1964	91.0	91.2	84.0		84.0	84.0	85.0	84.5		85.0	85.0	87.5		87.5
	1965	90.8	90.7					86.0	86.0	87.0		87.0	86.0		86.0
	1966	95.1	95.1	85.0		85.0	85.0		85.0	85.0		85.0	85.0		85.0
	1967	91.8	90.9	87.0	80.0	83.5	83.5		83.5	87.0	80.0	83.5	88.0	86.7	87.0
	1968	93.9	93.6								78.0	78.0	85.0		85.0
	1969	95.7	95.3	83.0		83.0	83.0		83.0	83.0		83.0	89.7		89.7

Appendix VI (continued)

Stations	Year	Average Maximum Temperature No-Rain-fall Days	Average Maximum Temperature Non-Measurable Days	A.M. 8 - 9 M	T	MT	9 - 10 M	T	MT	10 - 11 M	T	MT	A.M. 11 - 12 M	T	MT
				Average Maximum Temperature for Days with Convective Rainfall Occurrences											
Mobile	1960	93.4	93.1												
	1961	91.3	91.1	87.0		87.0	87.3	91.0	88.3	88.5	8.50	87.3		90.0	90.0
	1962	84.4	94.7							87.0		87.0	87.0		87.0
	1963	93.0	92.8	86.5		86.5	86.5	85.0	86.0	84.5	90.0	87.3	87.3	90.0	88.4
	1964	90.8	90.4				85.0		85.0	85.0	90.0	87.5	93.0	87.4	88.3
	1965	91.2	90.6	87.5		87.5	87.5	88.0	87.8	89.0	87.0	87.8	89.0	88.0	88.3
	1966	94.6	94.5								90.5	90.5	90.0		90.0
	1967	93.0	93.1	84.0	84.0	84.0	85.0	86.0	85.5	88.0	86.6	87.2	86.3	89.8	83.3
	1968	93.2	93.3							90.0		90.0	90.5		90.5
	1969	94.2	93.9	87.5	89.0	88.3	88.0		88.0		90.5	90.5	91.0	88.5	90.0
Morgan City	1960		95.8	94.0		94.0	93.7		93.7	94.3		94.3	95.5		95.5
	1961		90.0	87.0		87.0	90.0		90.0	90.5		90.5	92.0		92.0
	1962		94.5												
	1963		90.9	91.7		91.7	92.7		92.7	92.5		92.5	96.0		96.0
	1964		92.9	89.0		89.0	89.0		89.0	89.5		89.5	92.0		92.0
	1965		91.3	93.0		93.0	93.0		93.0	92.3		92.3	92.3		92.3
	1966		93.4	92.7		92.7	90.5		90.5	91.0		91.0	91.5		91.5
	1967		93.4	93.5		93.5	90.0		90.0	93.0		93.0	93.5		93.5
	1968		91.8	87.5		87.5	86.0		86.0	90.5		90.5	95.0		95.0
	1969		94.1	80.0		80.0	82.5		82.5	88.5		88.5	89.5		89.5
New Orleans	1960	94.8	94.2											92.0	92.0
	1961	89.8	89.3					86.0	86.0		86.0	86.0		87.0	87.0
	1962	93.4	93.7											90.0	90.0
	1963	91.0	90.8	82.0			93.5	91.0	86.0	89.5	85.0	88.0	88.2	87.5	88.0
	1964	91.0	90.0	85.0	89.0	87.0	85.0		85.0	87.0	86.0	86.3	87.0	87.0	87.0
	1965	90.4	90.6	87.0	83.0	86.0	85.0	89.0	87.0	86.0		86.0	87.5	88.0	87.7
	1966	93.2	92.9	89.0		89.0	87.0		87.0	88.3	95.0	90.0	88.0	90.0	89.0
	1967	91.0	90.3	86.0	82.0	84.0	86.0		86.0	87.0		87.0	87.7	87.0	87.5
	1968	93.3	93.0				89.0		89.0	89.0		89.0	89.3	90.0	89.5
	1969	92.8	71.9		84.5	84.5				86.5	88.0	87.0	86.5	90.0	88.2

Appendix VI (continued)

Stations	Year	Average Maximum Temperature: No-Rainfall	Average Maximum Temperature: Non-Measurable Days	A.M. 8 - 9 M	T	MT	9 - 10 M	T	MT	10 - 11 M	T	MT	A.M. 11 - 12 M	T	MT
				Average Maximum Temperature for Days with Convective Rainfall Occurrences											
Pensacola	1960	91.8	91.8				85.0		85.0	88.3		88.3	89.0		89.0
	1961	89.6	89.8				84.5	85.0	84.7	83.3		83.3	81.0	89.0	85.0
	1962	91.0	91.1				88.0	85.0	87.0				91.0		91.0
	1963	88.7	89.1	80.0	82.0	81.0	83.5	91.0	86.0	82.0	82.0	82.0	85.0	82.0	83.5
	1964	89.7	89.3	85.0	87.5	86.7	87.5	88.0	87.7	87.0	88.0	87.3	88.0	86.0	87.0
	1965	89.4	89.4	84.8	89.0	85.6	85.3		85.3	83.0	88.5	86.7	87.8	86.0	87.2
	1966	91.0	90.8	89.0	89.0	89.0	88.0		88.0	89.0		89.0			
	1967	88.0	89.2	85.0	79.0	82.0	84.8	87.0	85.2	85.0	86.5	85.4	85.0	89.3	86.9
	1968	90.7	90.1	88.0	85.0	86.5	85.0		85.0		89.0	89.0	87.0	88.0	87.5
Saucier	1960		96.3										93.5		93.5
	1961		91.6				88.5		88.5	88.0		88.0	88.0		88.0
	1962		94.6												
	1963		91.9	88.0		88.0	91.5		91.5	90.0		90.0	88.3		88.3
	1964		91.2	88.0		88.0	87.7		87.7	87.5		87.5	88.8		88.8
	1965		91.8	88.5		88.5	88.5		88.5	89.0		89.0	88.5		88.5
	1966		93.4	95.0		95.0	92.0		92.0	89.0		89.0			
	1967		91.6	88.5		88.5	82.5		82.5	82.5		82.5	86.7		86.7
	1968		92.8	90.0		90.0	90.0		90.0				90.0		90.0
	1969		94.5				90.0		90.0	89.0		89.0	89.0		89.0
Tallahassee	1960	93.0	90.8		86.0	86.0				86.0	85.5	85.7	87.0	86.5	86.8
	1961	91.6	91.3										87.0	87.0	87.0
	1962	93.6	93.0							93.0	85.0	89.0	92.0	87.0	88.7
	1963	92.8	92.2	85.0	94.0	87.3	77.0	87.0	82.0	84.7		84.7	84.7		84.7
	1964	90.3	90.6	87.0		87.0	85.7		85.7	79.0	89.0	85.7	84.0	90.0	86.0
	1965	93.3	92.4							85.0	84.7	84.8	87.2	84.0	86.0
	1966	95.6	95.5	82.0	94.0	88.0	82.0	94.0	88.0	86.0	94.0	88.7	8.60	94.0	88.7
	1967	93.3	92.4		89.5	89.5		89.0	89.0	88.6	91.5	89.8	89.3	91.0	89.8
	1968	94.8	93.7		87.0	87.0					87.0	87.0	88.5	87.0	88.0
	1969	93.3	93.2	80.3	80.5	84.4	80.8	88.0	82.2	85.0	85.0	85.0	84.4	90.5	86.1

Appendix VI (continued)

Stations	Year	Average Maximum Temperature: No-Rainfall Days	Average Maximum Temperature: Non-Measurable Days	Average Maximum Temperature for Days with Convective Rainfall Occurrences: A.M. 8 - 9 M	T	MT	9 - 10 M	T	MT	10 - 11 M	T	MT	P.M. 11 - 12 M	T	MT
Troy	1960		92.5				91.0		91.0				90.5		90.5
	1961		90.8												
	1962		94.9				83.0		83.0	83.0		83.0			
	1963		91.3	84.0		84.0	84.0		84.0	84.0		84.0	87.5		87.5
	1964		87.9	81.0		81.0	81.7		81.7	82.0		82.0	84.0		84.0
	1965		89.8	79.0		79.0	81.5		81.5	81.5		81.5	81.5		81.5
	1966		98.2	86.0		86.0									
	1967		89.8										83.5		83.5
	1968		91.4	88.0		88.0	88.0		88.0	91.0		91.0	91.0		91.0
	1969		93.2							87.0		87.0	86.3		86.3
Tylertown	1960		97.9												
	1961		91.7										90.0		90.0
	1962		96.2												
	1963		92.6												
	1964		92.9				89.0			89.7		89.7	92.0		92.0
	1965		93.4							88.0		88.0	88.0		88.0
	1966		90.6	80.0		80.0	80.5		80.5	90.0		90.0	80.5		80.5
	1967		92.8							88.0		88.0			
	1968		93.8							89.7		89.7	88.0		88.0
	1969		94.6	97.0		97.0				97.0		97.0	95.0		95.0
Vermilion	1960		89.6	90.0		90.0	89.8		89.8	89.7		89.7	90.0		90.0
	1961		92.6	94.0		94.0									
	1962		90.2	89.5		89.5	89.5		89.5	89.7		89.7	89.3		89.3
	1963		89.2	87.0		87.0	85.5		85.5	85.5		85.5	88.5		88.5
	1964		89.8	87.0		87.0	87.0		87.0	86.5		86.5	90.2		90.2
	1965		90.6	88.3		88.3	88.3		88.3	88.0		88.0	85.0		85.0
	1966		89.6	91.5		91.5	90.7		90.7	92.0		92.0	90.6		90.6
	1967		88.7	88.5		88.5									

Appendix VI (continued)

Stations	Year	Average Maximum Temperature: No-Rainfall Days	Average Maximum Temperature: Non-Measurable Days	A.M. 8 - 9 M	T	MT	9 - 10 M	T	MT	10 - 11 M	T	MT	A.M. 11 - 12 M	T	MT
			Average Maximum Temperature for Days with Convective Rainfall Occurrences												
Wiggins			95.5												
			92.6										92.0		92.0
			95.3												
			93.9							93.0		93.0	93.0		93.0
			92.4				85.0		85.0	85.0		85.0			
			91.0	90.5		90.5	90.5		90.5	88.0		88.0	85.0		85.0
			93.3												
			95.1				90.0		90.0	96.0		96.0	96.0		96.0
Woodville			96.4										94.5		94.5
			90.1							87.5		87.5	87.5		87.5
			94.9												
			92.1				83.0		83.0	83.0		83.0	87.5		87.5
			91.3	90.5		90.5	91.0		91.0	90.5		90.5			
			90.1	83.3		83.3	84.5		84.5	86.7		86.7	84.5		84.5
			91.8							83.0		83.0	87.7		87.7
	1969		93.9	79.0		79.0	79.0		79.0	87.0		87.0	84.3		84.3

M = Measurable
T = Trace
MT = Measurable and Trace

[a]Calculated from Local Climatological Data and Hourly Precipitation Data

Appendix VI (continued)

Stations	Year	Average Maximum Temperature: No-Rainfall Days	Average Maximum Temperature: Non-Measurable Days	Average Maximum Temperature for Days with Convective Rainfall Occurrences, P.M. 12 - 1			1 - 2			2 - 3			3 - 4		
				M	T	MT	M	T	MT	M	T	MT	M	T	MT
Alexandria	1960	94.9	95.1		98.0	98.0	98.0	98.0	95.5	93.0		93.0	91.5		91.5
	1961	90.9	90.0	87.7	88.3	88.0	88.0	88.0	88.0	88.5	88.3	88.4	88.0	87.0	87.9
	1962	94.1	94.1				93.0		93.0	93.0		93.0	93.0		93.0
	1963	93.9	93.4		89.0	89.0	93.0	88.0	90.5	93.0	93.0	93.0	89.0	91.4	90.5
	1964	91.1	90.9	84.3		84.3		86.0	86.0		87.0	87.0	85.5		85.5
	1965	93.9	93.9	88.0		88.0	94.5	88.0	92.3	88.0	97.0	94.0	91.3	94.0	92.0
	1966	94.7	94.7		89.0	89.0	98.0		98.0	97.5		97.5	97.0	95.7	96.0
	1967	92.4	91.0	88.0	82.5	84.3	81.0	86.5	84.7	80.0	91.0	82.8	80.0	89.5	83.8
	1968	92.6	92.7	88.0	85.0	86.0	87.3		87.3	88.0	92.0	89.0	87.0	93.0	89.4
	1969														
Apalachicola	1960	89.6	88.5	87.0	85.7	80.2	87.5	82.0	85.1	87.5		97.5	90.0	88.0	89.5
	1961	89.0	89.1	88.0		88.0	88.0	84.0	88.5						
	1962	89.6	89.5		85.5										
	1963	88.5	88.4	85.0	86.5	85.4	84.0	88.0	84.8	86.0	83.5	84.8	89.0	83.5	86.3
	1964		87.1												
	1965	88.4	88.1	78.5	84.0	82.7	82.0	82.0	82.0	82.8	82.0	82.6	82.0	86.5	84.2
	1966	89.7	89.7	87.0	89.0	88.0	90.0	82.0	86.0		89.0	89.0	88.0		88.0
	1967	87.1	87.4	84.5	86.0	85.0	86.5	84.7	85.4	85.0		85.0	85.6	8.75	86.4
	1968	89.3	89.5		80.0	80.0		86.0	86.0	89.0	80.0	84.5	89.0	80.0	84.5
	1969	90.8	90.8	86.3	86.0	86.2	85.5	86.5	85.8	88.0	82.0	84.0	82.0	83.0	82.5
Bainbridge	1960														
	1961		93.7												
	1962		97.1				97.5		97.5				90.0		90.0
	1963		96.0	84.7		84.7	85.0		85.0				94.0		94.1
	1964		90.9	86.5		86.5	86.5		86.5	88.0		88.0	89.3		89.3
	1965		90.5	87.0		87.0	88.5		88.5	90.0		90.0	89.0		89.0
	1966		95.7				94.5		94.5	93.0		93.0	93.0		93.0
	1967		91.1	83.0		83.0				90.0		90.0	90.0		90.0
	1968		94.2							99.0		99.0	92.0		92.0
	1969		96.6	89.8		89.8	90.1		90.1	91.5		91.5	94.4		94.4

Appendix VI (continued)

Stations	Year	Average Maximum Temperature No-Rainfall Days	Average Maximum Temperature Non-Measurable Days	Average Maximum Temperature for Days With Convective Rainfall Occurrences P.M. 12 - 1 M	12 - 1 T	12 - 1 MT	1 - 2 M	1 - 2 T	1 - 2 MT	2 - 3 M	2 - 3 T	2 - 3 MT	P.M. 3 - 4 M	3 - 4 T	3 - 4 MT
Baton Rouge	1960	95.9	95.8		93.0	93.0	98.0		98.0	98.0	93.0	96.8	92.0	95.0	94.3
	1961	89.8	89.7	86.0	89.0	86.9	85.0	88.2	87.0	85.3	87.2	86.5	89.7	86.0	87.6
	1962	93.5	93.5	93.0		93.0	93.0	88.0	90.5	90.5		90.5	92.0	93.0	92.3
	1963	92.9	92.6	90.5		90.5	90.8	89.8	90.4	89.7	90.0	89.9	92.3	90.0	90.8
	1964	91.4	90.5	88.5	87.0	87.8	89.8	87.5	89.0	90.4	88.3	89.6	90.2	89.0	89.7
	1965	92.5	92.2	89.3	89.5	89.3	91.0	89.3	90.1	91.0	81.0	91.0	90.8	90.7	90.7
	1966	93.1	92.4	89.0		89.0	89.0		89.0	87.5		87.5	90.0	88.0	89.3
	1967	91.6	91.1	88.3	89.0	88.5	86.3	90.3	88.0	86.8	89.3	87.9	88.0	90.5	88.7
	1968	92.9	92.9	88.0	89.5	88.8	89.0	88.5	88.9	89.0	89.5	89.1	88.5	92.0	90.0
	1969	93.6	93.6	86.5	92.0	87.3	91.3	84.7	88.0	91.8	86.7	89.6	88.0	93.0	90.5
Brookhaven	1960		94.8	91.0		91.0	93.0		93.0	97.0		97.0			
	1961		89.6	88.0		88.0	88.7		88.7	90.5		90.5	90.0		90.0
	1962		95.2												
	1963		90.3	89.7		89.7	90.5		90.5	90.8		90.8	90.0		90.0
	1964		90.3	86.7		86.7	88.5		88.5	87.2		87.2	87.4		87.4
	1965		91.6	89.0		89.0	89.7		89.7	89.8		89.8	90.0		90.0
	1966		94.1	92.0		92.0	92.0		92.0	91.0		91.0	90.0		90.0
	1967		88.5	84.3		84.3	85.5		85.5	85.5		85.5	87.5		87.5
	1968		90.3	87.5		87.5	86.7		86.7	85.7		85.7	87.3		87.3
	1969		92.8	91.0		91.0	87.5		87.5	89.0		89.0	89.0		89.0
Burrwood	1960		93.2	88.0		88.0	89.0		89.0	89.0		89.0	89.0		89.0
	1961		88.1	87.0		87.0									
	1962		89.5	89.0		89.0	89.0		89.0						
	1963		89.4	86.8		86.8									
	1964		87.5	84.3		84.3	84.3		84.3	83.0		83.0	85.3		85.3
	1965		89.7	85.3		85.3	88.7		88.7	86.3		86.3	88.5		88.5
	1966														
	1967														
	1968		89.6	86.0		86.0	86.3		86.3	86.5		86.5			
	1969		90.9	90.0		90.0	90.3		90.3				91.0		91.0

Appendix VI (continued)

Stations	Year	Average Maximum Temperature: No-Rainfall Day	Average Maximum Temperature: Non-Measurable Days	Average Maximum Temperature for Days with Convective Rainfall Occurrences P.M. 12 - 1: M	T	MT	P.M. 1 - 2: M	T	MT	P.M. 2 - 3: M	T	MT	P.M. 3 - 4: M	T	MT
Clinton	1960		99.6	98.0		98.0	99.0		99.0	98.0		98.0	98.3		98.3
	1961		92.6	89.3		89.3	90.0		90.0	91.7		91.7	92.5		92.5
	1962		96.1												
	1963		92.8	95.5		95.5	93.3		93.3	95.0		95.0	95.0		95.0
	1964		91.5	89.0		89.0	90.0		90.0	90.0		90.0	90.8		90.8
	1965		94.0	94.0		94.0	94.0		94.0	92.5		92.5	93.0		93.0
	1966														
	1967		90.5	85.4		85.4	86.2		86.2	86.0		86.0	89.6		89.6
	1968		91.6				89.0		89.0	90.3		90.3	90.0		90.0
	1969		95.3	85.0		85.0	85.7		85.7	98.0		92.0	85.0		85.0
Collins	1960		97.2	96.5		96.5	96.5		96.5	97.0		97.0	97.3		97.3
	1961		90.6	91.0		91.0	90.3		90.3	90.3		90.3	89.8		89.8
	1962		95.6	90.5		90.5	90.5		90.5	90.5		90.5			
	1963		81.8	88.0		88.0	86.0		86.0	89.0		89.0	89.0		89.0
	1964		89.7	88.0		88.0	87.5		87.5	90.0		90.0	86.3		86.3
	1965		91.2	85.8		85.8	85.0		85.0	88.8		88.8	88.4		88.4
	1966		94.4	89.0		89.0	89.0		89.0	89.0		89.0	89.3		89.3
	1967		88.5	85.0		85.0	85.3		85.3	86.2		86.2	88.0		88.0
	1968		92.4				86.0		86.0	86.0		86.0	86.8		86.8
	1969		94.8	85.0		85.0	88.0		88.0						
Crestview	1960		92.5	91.2		91.2	91.3		91.3	90.5		90.5	90.3		90.3
	1961														
	1962		93.0	90.7		90.7	88.8		88.8	90.1		90.1	90.3		90.3
	1963		91.4	86.0		86.0	86.6		86.6	88.8		88.8	86.7		86.7
	1964		91.3	89.3		89.3	87.7		87.7	89.0		89.0	86.0		86.0
	1965		93.1	93.3		93.3	93.0		93.0	93.0		93.0	92.7		92.7
	1966		91.3	91.5		91.5	91.5		91.5	91.8		91.8	92.3		92.3
	1967		92.8	96.0		96.0	94.0		94.0	95.5		95.5	94.5		94.5
	1968		94.4	92.2		92.2	92.6		92.6	91.3		91.3	90.8		90.8

Stations	Year	Average Maximum Temperature: No-Rain-fall Days	Average Maximum Temperature: Non-Measur-able Days	Average Maximum Temperature for Days With Convective Rainfall Occurrences, P.M. 12 - 1: M	12 - 1: T	12 - 1: MT	1 - 2: M	1 - 2: T	1 - 2: MT	2 - 3: M	2 - 3: T	2 - 3: MT	P.M. 3 - 4: M	3 - 4: T	3 - 4: MT
Ft. Morgan	1960		91.9	89.5		89.5									
	1961														
	1962		91.0							90.0		90.0	90.5		90.5
	1963														
	1964		88.4	87.0		87.0	87.0		87.0	87.0		87.0	87.0		87.0
	1965		87.2	85.7		85.7	85.7		85.7	86.0		86.0	86.0		86.0
	1966		88.7							87.5		87.5	89.0		89.0
	1967		87.9	89.5		89.5	89.0		89.0	89.0		89.0	90.0		90.0
	1968		90.9	87.0		87.0									
	1969		90.2				90.7		90.7	90.7		90.7	90.7		90.7
Jackson	1960	96.9	96.9					97.0	97.0		97.0	97.0	97.0	97.3	97.3
	1961	90.7	90.4		88.7	88.7	87.0	92.0	88.7	88.2	90.0	88.5	90.0	88.8	88.4
	1962	95.7	95.6							89.0	94.0	91.5		91.5	91.5
	1963	92.1	92.2	84.0	84.0	84.0	85.5	81.0	84.0	85.5	93.0	90.0	93.0	92.7	92.8
	1964	92.5	92.3		89.0	89.0					90.0	90.0	91.5	91.0	92.3
	1965	93.4	93.2		94.0	94.0	94.0	93.5	93.8	94.0	91.0	92.5	92.0	8.90	91.4
	1966	95.8	95.8		82.0	82.0	82.0		82.0						
	1967	89.4	88.5	91.0	82.3	84.0		83.5	83.5	79.0	85.1	84.0	83.0	87.0	85.0
	1968	92.4	92.3	87.0	92.0	90.3		90.3	90.3	91.0	91.5	91.3	90.7	94.0	92.0
	1969	95.8	95.9	89.0		89.0	91.0	84.0	81.5	94.0		94.0	96.5	97.0	96.8
Lafayette	1960		96.2	93.0		93.0	90.0		90.0	92.5		92.5	94.7		94.7
	1961		92.8	86.3		86.3	87.0		87.0	91.4		91.4	89.0		89.0
	1962														
	1963		91.7	89.5		89.5	88.3		88.3	89.0		89.0	89.0		89.0
	1964		89.9	79.7		79.7	77.0		77.0	78.0		78.0	78.0		78.0
	1965		89.9	90.0		90.0				89.5		89.5	89.4		89.4
	1966		89.7	86.5		86.5				90.0		90.0	90.5		90.5
	1967		89.3	84.8		84.8	84.8		84.8	84.3		84.3	86.0		86.0
	1968		89.9										90.0		90.0
	1969		93.2	84.0		84.0				87.5		87.5			

Appendix VI (continued)

Stations	Year	Average Maximum Temperature No-Rainfall Days	Average Maximum Temperature Non-Measurable Days	Average Maximum Temperature for Days with Convective Rainfall Occurrences P.M. 12 - 1 M	T	MT	1 - 2 M	T	MT	2 - 3 M	T	MT	3 - 4 M	T	MT
Lake Arthur	1960		93.5	93.0		93.0	93.0		93.0	98.0		98.0	98.0		98.0
	1961		88.1	88.5		88.5	89.8		89.8	89.2		89.2	86.0		86.0
	1962		93.0										88.0		88.0
	1963		89.5	89.3		89.3	89.0		89.0	89.5		89.5	91.0		91.0
	1964		90.5	87.5		87.5	90.0		90.0	85.0		85.0	87.5		87.5
	1965		92.1	90.0		90.0	90.3		90.3	90.0		90.0			
	1966		90.9	90.0		90.0	89.3		89.3	91.5		91.5	92.5		92.5
	1967		88.2	88.7		88.7	88.7		88.7	88.0		88.0	88.0		88.0
	1968														
	1969		92.1												
Meridian	1960	97.5	97.6										98.5		98.5
	1961	91.4	91.2	90.3	90.0	90.2	90.0	92.0	91.3	91.0	92.0	91.3	90.7	91.5	91.0
	1962	97.7	97.9	90.0		90.0	86.5		86.5	91.3		91.3	87.3	89.0	87.8
	1963	92.7	92.1	90.0		90.0	86.5		86.5	91.3		91.3	87.3	89.0	87.8
	1964	91.0	91.2	90.0	85.0	87.5	89.0	90.0	89.0	88.7	94.0	90.0	89.0	94.0	90.7
	1965	90.8	90.7	91.0	90.0	90.5	89.0	90.0	89.3	88.5	90.0	89.4	88.0	90.0	88.7
	1966	85.1	95.1	85.0		85.0							10.0		10.0
	1967	91.8	90.9	84.0	86.7	85.6	83.0	84.3	83.8	84.5	87.0	85.3	83.3	90.5	85.7
	1968	93.9	93.6		85.0	85.0	89.0		89.0	95.5	89.0	93.3	93.7	89.0	92.5
	1969	95.7	95.3	92.5	89.0	91.3	92.5		92.5	92.7	89.0	91.8	91.5	92.0	91.8
Mobile	1960	93.4	93.1		92.0	92.0	92.5	92.0	92.3	92.3	92.0	92.3	91.3	92.0	92.0
	1961	91.3	91.1	87.5	91.0	89.6	91.0	88.7	89.6	90.5		90.5	92.0	90.0	91.0
	1962	84.4	94.7				94.0		94.0	94.3	87.0	92.5	90.3	95.0	91.5
	1963	93.0	92.8	90.0	89.7	89.9	91.5	93.0	91.5	92.1	89.0	92.1	93.8	91.5	93.0
	1964	90.8	90.4	85.0	89.0	87.4	87.3	89.5	88.0	87.3		87.3	88.0	85.0	87.0
	1965	91.2	90.6	91.7	89.0	91.0	91.3	90.3	90.0	91.0		91.0	90.4	89.8	90.1
	1966	94.6	94.5							91.0	96.5	93.8	92.5	95.7	04.4
	1967	93.0	93.1	88.0		88.0	90.3		90.3	90.3	90.5	90.4	90.0	90.0	90.0
	1968	93.2	93.3		90.5	90.5	90.0	97.0	93.5	97.0	93.0	94.3		86.0	96.0
	1969	94.2	93.4	90.6	89.5	90.4	91.7	88.8	90.5	88.5	98.0	90.4	88.3	91.0	90.2

Appendix VI (continued)

Stations	Year	Average Maximum Temperature: No-Rain-fall Days	Average Maximum Temperature: Non-Measur-able Days	Average Maximum Temperature for Days with Convective Rainfall Occurrences, P.M. 12 - 1: M	12 - 1: T	12 - 1: MT	1 - 2: M	1 - 2: T	1 - 2: MT	2 - 3: M	2 - 3: T	2 - 3: MT	P.M. 3 - 4: M	3 - 4: T	3 - 4: MT
Morgan City	1960		95.8							94.0		94.0			
	1961		90.0				88.0		88.0	88.3		88.3	88.3		88.3
	1962		94.5	95.0		95.0	92.5		92.5	92.5		92.5	92.5		92.5
	1963		90.9	93.0		93.0	93.5		93.5	92.4		92.4	92.4		92.4
	1964		92.9	90.0		90.0	91.0		91.0	94.0		94.0	89.5		89.5
	1965		91.3	90.3		90.3	92.0		92.0	91.0		91.0	91.7		91.7
	1966		93.4	91.5		91.5	92.5		92.5	93.3		93.3	92.7		92.7
	1967		93.4				94.0		94.0	94.0		94.0	94.8		94.8
	1968		91.8	89.0		89.0	87.7		87.7				87.5		87.5
	1969		99.1	85.0		85.0				91.0		91.0	90.0		90.0
New Orleans	1960	94.8	94.2					93.0	93.0		95.5	95.5	97.0	92.0	94.0
	1961	89.8	89.3		89.3	89.3	87.0	89.5	87.0	88.4	87.0	88.1	90.0	88.7	88.1
	1962	93.4	93.7							91.0	90.0	90.5		90.6	90.6
	1963	91.0	90.8	88.0	88.0	88.0	88.8	89.3	88.9	89.7	89.7	89.0	90.5	90.0	90.2
	1964	91.0	90.0	89.8	89.3	89.2	87.0	90.0	89.9	88.0	89.3	88.8	89.0	87.0	88.2
	1965	90.4	90.6	88.3	88.3	88.3	88.8	89.3	89.0	88.7	90.0	89.3	89.3	89.6	89.5
	1966	93.2	92.9	89.0	90.0	89.3	91.0	88.0	89.0	91.0	93.0	91.7	91.0	91.5	91.3
	1967	91.1	90.3	40.5	87.3	89.1	89.0	90.7	90.0	89.0	89.7	89.3	89.5		89.5
	1968	93.3	93.0	89.3		89.3	88.8	97.5	90.1	88.7	89.3	89.4	89.0	91.5	90.3
	1969	92.8	91.9	89.3	85.0	87.5	89.5	87.8	88.1	91.3	87.0	88.9	88.0	91.0	90.5
Pensacola	1960	91.8	91.8		90.0	90.0	90.0		90.0				95.0	91.0	93.0
	1961	89.6	89.8	89.0		89.0									
	1962	91.0	91.1	91.4	92.0	91.5	91.0	88.0	90.4	88.3	92.0	89.3	88.3		88.3
	1963	88.7	89.1	86.5	88.0	86.8	82.0	87.0	85.8	82.0	86.7	85.5	85.5		85.5
	1964	89.7	89.3	87.0	89.0	87.5	87.5		87.5	88.7		88.7	90.0	88.5	89.6
	1965	89.4	89.4	88.5	88.5	87.0	85.7	87.5	86.4	88.0	84.0	87.0	84.0		84.0
	1966	91.0	90.8	91.0		91.0	93.5	91.0	92.7	93.5		93.5	93.0	94.0	93.5
	1967	88.0	89.2	85.3	88.7	86.7	79.0		79.0	87.0	86.5	86.7		87.0	87.0
	1968	90.7	90.1	89.5		89.5	90.0		90.0				88.0		88.0

Appendix VI (continued)

Stations	Year	Average Maximum Temperature: No-Rainfall Days	Average Maximum Temperature: Non-Measurable Days	Average Maximum Temperature for Days with Convective Rainfall Occurrences: P.M. 12 - 1 M	T	MT	1 - 2 M	T	MT	2 - 3 M	T	MT	3 - 4 M	T	MT
Saucier	1960		96.3	93.0		93.0	92.8		92.8	92.0		92.0	92.0		92.0
	1961		91.6	89.0		89.0	90.0		90.0	91.0		91.0	91.5		91.5
	1962		94.6				97.0		97.0	95.7		95.7	96.0		96.0
	1963		91.9	87.7		87.7	85.5		85.5	92.7		92.7	92.6		92.6
	1964		91.2	90.0		90.0	90.7		90.7	90.7		90.7	90.2		90.2
	1965		91.8	89.3		89.3	88.5		88.5	90.5		90.5	90.1		90.1
	1966		93.4	89.0		89.0	89.0		89.0	91.0		91.0	91.7		91.7
	1967		91.6	86.7		86.7	85.7		85.7	86.8		86.8	85.7		85.7
	1968		92.8	89.0		89.0	91.0		91.0	92.5		92.5	95.0		95.0
	1969		94.5	90.0		90.0	91.7		91.7	92.7		92.7	91.8		91.8
Tallahassee	1960	93.0	90.8	88.0	86.5	87.0	89.7	87.5	88.8	89.4	92.0	89.8	89.0	88.0	88.8
	1961	91.6	91.3	87.7	90.0	88.6	89.9	88.7	89.3	89.8	90.8	90.2	92.0	89.8	90.6
	1962	93.6	93.0	88.7	89.0	88.8	92.0	87.7	88.8	91.2	90.3	91.0	90.5	91.4	91.1
	1963	92.8	92.2	87.4		87.4	85.0	89.8	88.2	94.0	90.3	87.8	91.3	92.0	91.6
	1964	90.3	90.6	88.4	79.0	86.8	87.7	79.0	85.5	88.5	85.0	86.4	87.4	91.7	88.7
	1965	93.3	92.4	89.2	85.8	87.7	87.5	87.2	87.3	89.5	90.0	89.6	90.3	93.0	91.0
	1966	95.6	95.5		82.0	82.0	92.5	88.7	90.2	92.0	92.8	92.5	94.0	92.0	93.3
	1967	93.3	92.4	90.0	89.8	89.9	90.1	90.3	90.2	90.2	90.0	90.1	90.4	89.5	90.1
	1968	94.8	93.7	87.5	87.0	87.5	89.0		89.0	92.0	87.0	89.5	92.0		92.0
	1969	93.3	93.2	86.3	90.5	87.6	86.1	92.0	87.4	86.7	94.0	87.6	86.5	90.0	87.9
Troy	1960		92.5	90.5		90.5	91.0		91.0				92.0		92.0
	1961		90.8				88.0		88.0	91.0		91.0	91.0		91.0
	1962		94.9	96.0		96.0	94.7		94.7	94.0		94.0	94.3		94.3
	1963		91.3	90.0		90.0	87.0		87.0	88.5		88.5	87.8		87.8
	1964		87.9	83.5		83.5	86.0		86.0	89.5		89.5			
	1965		89.8	81.5		81.5	87.0		87.0	89.0		89.0	88.4		88.4
	1966		98.2	90.0		90.0	94.5		94.5	97.0		97.0	95.7		95.7
	1967		89.8	85.5		85.5	85.5		85.5	87.0		87.0	87.3		87.3
	1968		91.4	91.0		91.0	88.0		88.0	86.0		86.0	89.0		89.0
	1969		93.2	86.0		86.0	88.3		88.3	90.0		90.0	88.8		88.8

Appendix VI (continued)

Stations	Year	Average Maximum Temperature No-Rainfall Days	Average Maximum Temperature Non-Measurable Days	Average Maximum Temperature for Days with Convective Rainfall Occurrences P.M. 12 - 1 M	T	MT	1 - 2 M	T	MT	2 - 3 M	T	MT	P.M. 3 - 4 M	T	MT
Tylertown	1960		97.9	95.5		95.5	93.0		93.0	98.3		98.3	87.0		87.0
	1961		91.7	88.0		88.0	88.0		88.0	90.4		90.4	91.2		91.2
	1962		96.2												
	1963		92.6				92.5		92.5	92.5		92.5	92.5		92.5
	1964		92.9	93.0		93.0	93.0		93.0	91.3		91.3	91.2		91.2
	1965														
	1966		93.4	90.0		90.0	89.3		89.3	89.3		89.3	90.0		90.0
	1967		90.6	86.0		86.0				88.5		88.5	91.0		91.0
	1968		92.8	82.0		82.0	88.0		88.0	93.0		93.0	93.5		93.5
	1969		93.8	91.5		91.5	88.0		88.0	88.0		88.0	95.0		95.0
			94.6	90.0		90.0	97.0		97.0	97.0		97.0	97.0		97.0
	1960														
Vermilion	1961		89.6	91.2		91.2	91.8		91.8	90.3		90.3	90.0		90.0
	1962		92.6	91.0		91.0				92.0		92.0	88.0		88.0
	1963		90.1	89.2		89.2	89.3		89.3	89.0		89.0	89.3		89.3
	1964		89.2	89.0		89.0	85.0		85.0	95.0		85.0	85.0		85.0
	1965		89.8	90.7		90.7	92.3		92.3	93.0		93.0	92.5		92.5
	1966		90.6	87.5		87.5	89.0		89.0	89.8		89.8	91.0		91.0
	1967		89.6	90.4		90.4	90.0		90.0	90.0		90.0	91.0		91.0
	1968		88.7	89.0		89.0	85.0		85.0	85.0		85.0	92.0		92.0
Wiggins	1960		95.5	96.7		96.7	96.0		96.0	96.6		96.6	96.7		96.7
	1961		92.6	92.0		92.0	90.5		90.5	94.5		94.5			
	1962		95.3										98.0		98.0
	1963		93.9	89.4		89.4	91.2		91.2	93.8		93.8	93.3		93.3
	1964		92.4	87.0		87.0	87.0		87.0	87.0		87.0	92.0		92.0
	1965														
	1966														
	1967		91.0	88.4		88.4	89.2		89.2	88.7		88.7	89.3		89.3
	1968		93.3	94.0		94.0	94.5		94.5	94.7		94.7	94.5		94.5
	1969		95.1	92.0		92.0	92.0		92.0	94.0		94.0	94.7		94.7

Appendix VI (continued)

Stations	Year	Average Maximum Temperature No-Rain-fall Days	Average Maximum Temperature Non-Measur-able Days	Average Maximum Temperature for Days with Convective Rainfall Occurrences P.M. 12 - 1 M	12 - 1 T	12 - 1 MT	1 - 2 M	1 - 2 T	1 - 2 MT	2 - 3 M	2 - 3 T	2 - 3 MT	P.M. 3 - 4 M	3 - 4 T	3 - 4 MT
Woodville	1960		96.4	94.5		94.5	94.5		94.5	97.0		97.0			
	1961		90.1	87.5		87.5	88.5		88.5	90.0		90.0	91.6		91.6
	1962		94.9										90.0		90.0
	1963		92.1				92.0		92.0	92.3		92.3	90.0		90.0
	1964														
	1965		91.3				92.5		92.5	92.3		92.3	92.0		92.0
	1966														
	1967		90.1	83.3		83.3	84.5		84.5	81.0		81.0	85.2		85.2
	1968		91.8	85.0		85.0	88.5		88.5	91.0		91.0	85.7		85.7
	1969		93.9	87.5		87.5	88.0		88.0	87.0		87.0	90.0		90.0

M = Measurable   T = Trace   MT = Measurable and Trace

[a]Calculated from Local Climatological Data and Hourly Precipitation Data

Appendix VII

NUMBER OF HOURS OF CONVECTIVE RAINFALL AND THE MEAN JULY TEMPERATURE

Station	Year	Mean July Max. Temp.	A.M. 8-9 M	8-9 T	8-9 MT	9-10 M	9-10 T	9-10 MT	10-11 M	10-11 T	10-11 MT	11-12 M	11-12 T	11-12 MT	12-1 M	12-1 T	12-1 MT	1-2 M	1-2 T	1-2 MT	2-3 M	2-3 T	2-3 MT	P.M. 3-4 M	3-4 T	3-4 MT
			Number of Hours in which Convective Rainfall Occurred																							
Alexandria	1960	94.0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	0	2	2	0	2
	1961	87.9	0	1	1	0	2	2	1	2	3	3	1	4	3	4	7	3	1	4	4	4	8	7	1	8
	1962	93.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	1	0	1
	1963	92.1	0	1	1	2	0	2	2	0	2	1	0	1	0	2	2	1	1	2	2	1	3	3	5	8
	1964	89.4	0	1	2	1	1	2	1	2	3	3	0	3	3	0	3	1	4	5	0	4	4	3	0	3
	1965	93.8	0	0	0	0	2	2	0	2	2	1	1	2	1	0	1	2	1	3	1	2	3	3	1	4
	1966	94.1	0	0	0	0	0	0	0	1	1	1	1	2	0	1	1	1	0	1	2	0	2	1	3	4
	1967	88.6	1	2	3	1	4	5	1	2	3	2	1	3	1	2	3	2	4	6	3	1	4	3	2	5
	1968	91.5	1	0	1	1	0	1	0	1	1	2	0	2	1	2	3	4	0	4	4	1	5	3	2	5
	1969	92.1	2		2	0		0	2		2	0		0	0		0	1		1	2		2	1		1
Apalachicola	1960	88.0	2	1	3	1	2	3	1	1	2	2	1	3	2	3	5	2	1	3	2	0	2	3	1	4
	1961	87.9	0	0	0	2	0	2	2	0	2	1	0	1	1	0	1	1	1	2	0	0	0	0	0	0
	1962	89.7	1	1	2	1	0	1	2	0	2	1	1	2	0	2	2	0	0	0	0	0	0	0	0	0
	1963	87.0	2	2	4	3	1	4	3	3	6	4	1	5	3	2	5	4	1	5	2	2	4	2	2	4
	1964	86.2																								
	1965	86.5	5	1	6	4	2	6	3	1	4	4	1	5	2	4	6	3	3	6	4	1	5	2	2	4
	1966	88.5	1	0	1	2	2	4	5	0	5	2	2	4	2	2	4	1	1	2	0	1	1	1	0	1
	1967	86.3	3	0	3	1	2	3	6	0	6	2	3	5	2	1	3	2	3	5	3	0	3	3	2	5
	1968	87.9	2	1	3	2	0	2	2	0	2	2	0	2	0	1	1	0	2	2	1	1	2	1	1	2
	1969	88.5	5	0	5	7	1	8	6	3	9	8	1	9	7	3	10	4	2	6	1	2	3	1	2	3
Bainbridge	1960		0		0	0		0	0		0	0		0	1		1	2		2	3		3	2		2
	1961	93.1	0		0	0		0	0		0	0		0	1		1	2		2	5		5	5		5
	1962	96.3	0		0	0		0	0		0	1		1	0		0	2		2	0		0	1		1
	1963	93.9	3		3	3		3	2		2	2		2	3		3	1		1	0		0	1		1
	1964	89.7	1		1	0		0	0		0	2		2	2		2	2		2	4		4	7		7
	1965	89.4	0		0	0		0	0		0	1		1	2		2	4		4	3		3	3		3
	1966	93.6	1		1	1		1	1		1	1		1	0		0	2		2	1		1	1		1
	1967	90.2	0		0	0		0	4		4	3		3	1		1	0		0	1		1	2		2
	1968	93.4	0		0	1		1	1		1	0		0	0		0	0		0	1		1	1		1
	1969	94.1	1		1	2		2	2		2	1		1	4		4	7		7	3		3	8		8

Station	Year	Mean July Max. Temp.	A.M. 8-9			9-10			10-11			11-12			P.M. 12-1			1-2			2-3			3-4		
			M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT
Baton Rouge	1960	96.4	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	0	1	3	1	4	1	3	4
	1961	88.0	0	0	0	0	0	0	0	0	0	3	1	4	5	2	7	3	5	8	3	5	8	3	4	7
	1962	93.6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	2	2	0	2	2	1	3
	1963	91.6	0	2	2	1	0	1	0	0	0	0	1	1	2	0	2	6	4	10	3	7	10	3	6	9
	1964	89.8	0	1	1	0	2	2	0	1	1	1	4	5	2	2	4	4	2	6	5	3	8	5	4	9
	1965	91.5	0	0	0	0	0	0	1	3	4	2	2	4	4	2	6	4	4	8	3	4	7	4	3	7
	1966	91.9	0	0	0	1	0	1	1	2	3	1	2	3	1	0	1	1	0	1	2	0	2	2	1	3
	1967	89.4	1	0	1	2	0	2	3	0	3	4	1	5	6	3	9	4	3	7	4	3	7	5	2	7
	1968	91.6	0	1	1	0	4	4	2	2	4	1	2	3	2	2	4	5	2	7	5	2	7	4	3	7
	1969	91.8	2	1	3	2	1	3	3	0	3	3	0	3	6	1	7	3	3	6	4	3	7	3	3	6
Brookhaven	1960	94.4	0		0	0		0	0		0	0		0	1		1	2		2	1		1	0		0
	1961	88.0	0		0	0		0	0		0	0		0	5		5	6		6	2		2	3		3
	1962	95.3	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0		0
	1963	90.2	0		0	0		0	0		0	0		0	3		3	6		6	4		4	1		1
	1964	88.7	1		1	2		2	2		2	2		2	3		3	2		2	5		5	5		5
	1965	91.5	0		0	0		0	0		0	1		1	1		1	3		3	5		5	6		6
	1966	93.1	0		0	0		0	0		0	0		0	1		1	1		1	2		2	1		1
	1967	87.0	3		3	2		2	4		4	4		4	4		4	4		4	4		4	6		6
	1968	89.7	1		1	1		1	2		2	2		2	2		2	3		3	3		3	4		4
	1969	92.1	0		0	0		0	0		0	0		0	1		1	2		2	3		3	3		3
Burrwood	1960	91.2	3		3	3		3	2		2	1		1	2		2	2		2	1		1	1		1
	1961	87.8	0		0	1		1	2		2	2		2	1		1	0		0	0		0	0		0
	1962	89.5	3		3	3		3	3		3	2		2	1		1	1		1	1		1	0		0
	1963	88.4	2		2	5		5	3		3	4		4	4		4	0		0	0		0	0		0
	1964	86.5	3		3	1		1	1		1	1		1	5		5	4		4	3		3	3		3
	1965	88.5	3		3	4		4	5		5	4		4	4		4	3		3	4		4	2		2
	1966	89.5																								
	1967	87.5																								
	1968	88.3	2		2	2		2	4		4	2		2	4		4	3		3	2		2	0		0
	1969	90.0	2		2	0		0	0		0	0		0	3		3	4		4	0		0	2		2

Station	Year	Mean July Max. Temp.	A.M.												P.M.											
			8-9			9-10			10-11			11-12			12-1			1-2			2-3			3-4		
			M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT
Clinton	1960	99.0	0		0	0		0	0		0	0		0	2		2	1		1	3		3	4		4
	1961	90.7	0		0	0		0	1		1	3		3	4		4	7		7	6		6	4		4
	1962	96.4	0		0	0		0	0		0	0		0	0		0	1		1	0		0	0		0
	1963	92.8	0		0	0		0	0		0	0		0	2		2	3		3	1		1	1		1
	1964	90.6	0		0	0		0	1		1	1		1	1		1	3		3	3		3	5		5
	1965	93.7	0		0	0		0	1		1	0		0	1		1	1		1	6		6	5		5
	1966	92.5																								
	1967	88.8	3		3	3		3	3		3	3		3	5		5	5		5	3		3	4		4
	1968	90.8	0		0	0		0	0		0	2		2	0		0	2		2	4		4	1		1
	1969	93.3	3		3	4		4	4		4	5		5	2		2	3		3	1		1	2		2
Collins	1960	95.6	0		0	0		0	1		1	1		1	2		2	2		2	3		3	3		3
	1961	89.2	0		0	0		0	0		0	2		2	1		1	4		4	4		4	4		4
	1962	95.3	0		0	0		0	0		0	0		0	2		2	2		2	2		2	0		0
	1963	91.0	0		0	0		0	1		1	2		2	2		2	1		1	5		5	5		5
	1964	88.6	1		1	2		2	2		2	2		2	3		3	2		2	1		1	3		3
	1965	90.4	0		0	1		1	1		1	3		3	4		4	2		2	6		6	7		7
	1966	93.3	1		1	1		1	1		1	1		1	1		1	1		1	2		2	3		3
	1967	87.1	2		2	3		3	2		2	2		2	1		1	4		4	5		5	4		4
	1968	91.1	0		0	0		0	0		0	0		0	0		0	2		2	2		2	4		4
	1969	93.3	0		0	1		1	1		1	1		1	1		1	1		1	0		0	0		0
Crestview	1960	93.7																								
	1961	91.6	0		0	0		0	2		2	2		2	5		5	4		4	2		2	4		4
	1962	93.8																								
	1963	90.0	2		2	3		3	4		4	4		4	3		3	5		5	8		8	6		6
	1964	89.7	0		0	1		1	2		2	2		2	4		4	5		5	4		4	6		6
	1965	90.3	3		3	1		1	0		0	3		3	4		4	7		7	3		3	2		2
	1966	92.6	0		0	0		0	0		0	1		1	3		3	2		2	2		2	3		3
	1967	91.1	3		3	2		2	4		4	4		4	4		4	4		4	4		4	3		3
	1968	92.8	0		0	1		1	1		1	1		1	1		1	2		2	2		2	2		2
	1969	93.7	1		1	0		0	2		2	3		3	5		5	5		5	4		4	5		5

Station	Year	Mean July Max. Temp.	A.M.												P.M.											
			8-9			9-10			10-11			11-12			12-1			1-2			2-3			3-4		
			M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT
Ft. Morgan	1960	91.2	0		0	0		0	0		0	2		2	2		2	0		0	0		0	0		0
	1961	88.0																								
	1962	90.8	0		0	0		0	0		0	1		1	0		0	0		0	1		1	2		2
	1963	88.0																								
	1964	87.7	2		2	1		1	0		0	0		0	1		1	1		1	1		1	1		1
	1965	87.0	3		3	4		4	5		5	3		3	3		3	3		3	4		4	4		4
	1966	88.4	2		2	2		2	2		2	1		1	0		0	0		0	2		2	3		3
	1967	87.3	4		4	3		3	1		1	0		0	2		2	3		3	2		2	1		1
	1968	90.2	2		2	3		3	1		1	0		0	1		1	0		0	0		0	0		0
	1969	89.2	2		2	2		2	0		0	0		0	0		0	3		3	3		3	3		3
Jackson	1960	95.7	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	2	1	3	4
	1961	88.4	0	1	1	0	0	0	0	0	0	0	3	3	0	3	3	2	1	3	5	1	6	4	4	8
	1962	95.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	2	2
	1963	91.2	1	1	2	2	1	3	1	3	4	1	0	1	2	1	3	2	1	3	2	3	5	1	3	4
	1964	90.7	2	0	2	1	2	3	1	1	2	0	1	1	0	1	1	0	1	1	0	1	1	2	1	3
	1965	93.0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2	4	2	2	4	4	1	5
	1966	94.2	1	0	1	1	0	1	1	0	1	1	0	1	0	1	1	1	0	1	0	0	0	0	0	0
	1967	87.1	1	2	3	3	1	4	3	1	4	2	3	5	1	4	5	0	2	2	1	2	3	2	2	4
	1968	91.7	0	0	0	0	0	0	0	0	0	1	0	1	1	2	3	0	4	0	2	2	4	3	1	4
	1969	93.9	1	0	1	1	1	2	3	0	3	3	2	5	4	0	4	1	1	2	1	0	1	2	2	4
Lafayette	1960	95.7	0		0	0		0	0		0	0		0	1		1	1		1	2		2	3		3
	1961	89.9	1		1	0		0	3		3	4		4	3		3	2		2	5		5	4		4
	1962	94.9																								
	1963	90.8	1		1	2		2	1		1	3		3	4		4	4		4	3		3	4		4
	1964	87.5	1		1	1		1	1		1	2		2	2		2	1		1	1		1	0		0
	1965	90.0	0		0	1		1	2		2	2		2	1		1	0		0	4		4	5		5
	1966	88.9	1		1	1		1	1		1	0		0	2		2	0		0	1		1	2		2
	1967	86.8	2		2	1		1	3		3	5		5	6		6	6		6	3		3	5		5
	1968	89.1	0		0	1		1	1		1	2		2	0		0	0		0	0		0	3		3
	1969	92.0	1		1	2		2	2		2	1		1	1		1	0		0	2		2	0		0

Stations	Year	Mean July Max. Temp.	A.M. 8-9 M	T	MT	9-10 M	T	MT	10-11 M	T	MT	11-12 M	T	MT	P.M. 12-1 M	T	MT	1-2 M	T	MT	2-3 M	T	MT	3-4 M	T	MT
Lake Arthur	1960	93.9	1		1	1		1	1		1	0		0	2		2	2		2	1		1	1		1
	1961	88.1	1		1	1		1	0		0	2		2	2		2	5		5	3		3	1		1
	1962	93.3	0		0	0		0	0		0	0		0	0		0	0		0	0		0	1		1
	1963	89.8	1		1	1		1	1		1	3		3	3		3	4		4	4		4	1		1
	1964	89.3	3		3	4		4	2		2	3		3	2		2	2		2	1		1	2		2
	1965	92.0	0		0	1		1	2		2	1		1	2		2	3		3	2		2	0		0
	1966	91.1	3		3	3		3	1		1	3		3	2		2	3		3	2		2	2		2
	1967	87.5	5		5	4		4	6		6	4		4	3		3	3		3	3		3	2		2
	1968	90.7																								
	1969	92.0																								
Meridan	1960	96.0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
	1961	90.0	0	0	0	0	0	0	0	0	0	3	2	5	3	2	5	1	1	2	2	1	3	3	2	5
	1962	97.2	0	0	0	0	0	0	1	0	1	1	1	2	1	3	4	0	0	0	3	1	4	1	4	5
	1963	91.3	0	1	1	1	0	1	1	2	3	1	2	3	2	0	2	2	0	2	4	0	4	3	1	4
	1964	89.7	1	0	1	1	1	2	0	1	1	2	0	2	1	1	2	2	1	3	3	1	4	2	1	3
	1965	90.5	0	0	0	0	1	1	2	0	2	1	0	1	1	1	2	3	0	3	2	3	5	2	1	3
	1966	93.9	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	0	0	0	0	0	0	1	0	1
	1967	88.7	1	1	2	2	0	2	1	1	2	1	3	4	2	3	5	2	3	5	4	2	6	4	2	6
	1968	92.0	0	0	0	0	0	0	0	1	1	2	0	2	0	2	2	1	0	1	2	1	3	3	1	4
	1969	93.4	1	0	1	1	0	1	1	0	1	3	0	3	2	1	3	2	0	2	3	1	4	2	2	4
Mobile	1960	92.2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	3	3	1	4	3	1	4
	1961	90.0	1	0	1	3	1	4	2	1	3	0	2	2	2	3	5	2	3	5	2	2	4	1	2	3
	1962	93.3	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	1	0	1	3	1	4	3	1	4
	1963	91.5	2	0	2	2	1	3	2	2	4	3	2	5	4	3	7	6	2	8	7	1	8	4	2	6
	1964	89.0	0	0	0	1	0	1	1	1	2	1	5	6	2	3	5	4	2	6	4	0	4	2	1	3
	1965	91.0	2	0	2	2	2	4	2	3	5	1	3	4	3	1	4	6	4	10	6	0	6	5	5	10
	1966	93.1	0	0	0	0	0	0	0	2	2	1	0	1	0	0	0	0	0	0	2	2	4	2	3	5
	1967	90.5	2	1	3	2	2	4	4	5	9	3	4	7	4	0	4	4	0	4	6	2	8	4	3	7
	1968	92.4	0	0	0	0	0	0	1	0	1	2	0	2	0	2	2	1	1	2	1	2	3	0	1	1
	1969	91.5	2	2	4	3	0	3	0	4	4	3	2	5	9	2	11	6	4	10	4	1	5	3	3	6

Stations	Year	Mean July Max. Temp.	A.M.												P.M.											
			8-9			9-10			10-11			11-12			12-1			1-2			2-3			3-4		
			M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT
Morgan City	1960	95.3	2		2	3		3	4		4	2		2	0		0	0		0	1		1	0		0
	1961	88.9																								
	1962	94.5	0		0	0		0	0		0	0		0	1		1	2		2	2		2	2		2
	1963	91.7	3		3	3		3	2		2	1		1	1		1	2		2	5		5	5		5
	1964	91.4	3		3	3		3	4		4	5		5	2		2	2		2	1		1	2		2
	1965	91.8	2		2	2		2	3		3	4		4	3		3	4		4	4		4	3		3
	1966	93.6	3		3	2		2	3		3	2		2	2		2	4		4	4		4	3		3
	1967	92.3	2		2	1		1	1		1	2		2	0		0	1		1	3		3	4		4
	1968	91.3	2		2	1		1	2		2	1		1	2		2	3		3	0		0	2		2
	1969	92.1	1		1	2		2	4		4	2		2	2		2	0		0	2		2	1		1
New Orleans	1960	94.1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	2	2	1	3	4
	1961	88.5	0	0	0	0	1	0	0	1	1	0	1	1	0	3	3	4	1	5	7	2	9	2	9	11
	1962	92.8	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	1	1	2	0	3	3
	1963	89.5	1	0	1	2	1	3	2	1	3	5	2	7	5	3	5	8	3	11	6	3	9	2	4	6
	1964	89.0	1	2	3	1	0	1	1	2	3	1	1	2	4	2	6	1	4	5	2	3	5	3	2	5
	1965	89.6	2	1	3	1	1	2	3	0	3	2	7	9	3	3	6	4	4	8	3	3	6	3	5	8
	1966	91.9	1	0	1	2	0	2	3	1	4	3	2	4	3	1	4	1	2	3	2	1	3	2	2	4
	1967	89.5	1	1	2	1	0	1	2	0	2	3	1	4	4	3	7	4	3	7	3	3	6	4	0	4
	1968	91.2	0	0	0	1	0	1	1	0	1	3	1	4	6	0	6	5	2	7	4	3	7	3	2	3
	1969	90.6	0	2	2	0	0	0	2	1	3	3	2	5	5	3	8	2	7	9	3	4	7	1	5	6
Pensacola	1960	90.7	0	0	0	1	0	1	3	0	3	4	0	4	0	1	1	1	0	1	0	0	0	1	1	2
	1961	88.6	0	0	0	2	1	3	3	0	3	1	1	2	2	0	2	0	0	0	0	0	0	0	0	0
	1962	91.2	0	0	0	2	1	3	0	0	0	2	0	2	5	1	6	4	1	5	3	1	4	3	0	3
	1963	87.9	1	1	2	2	1	3	1	1	2	1	1	2	4	1	5	1	3	4	1	3	4	4	0	4
	1964	88.3	1	2	3	2	1	3	3	1	4	1	1	2	3	1	4	4	0	4	3	0	3	5	2	7
	1965	88.5	4	1	5	4	0	4	1	2	3	4	2	6	6	2	8	3	2	5	3	1	4	1	0	1
	1966	90.4	1	1	2	2	0	2	1	0	1	0	0	0	1	0	0	2	1	3	2	0	2	1	1	2
	1967	87.4	1	1	2	5	1	6	5	2	7	4	3	7	4	3	7	1	0	1	1	2	3	0	2	2
	1968	88.9	1	1	2	1	0	1	0	1	1	1	1	2	4	0	4	1	0	1	0	0	0	0	1	1
	1969	88.7																								

Stations	Year	Mean July Max. Temp.	A.M.												P.M.											
			8-9			9-10			10-11			11-12			12-1			1-2			2-3			3-4		
			M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT
Saucier	1960	95.0	0		0	0		0	0		0	2		2	6		6	4		4	2		2	2		2
	1961	90.5	0		0	3		2	1		1	1		1	1		1	2		2	2		2	4		4
	1962	94.8	0		0	0		0	0		0	0		0	0		0	1		1	3		3	2		2
	1963	91.3	1		1	2		2	3		3	4		4	3		3	2		2	3		3	7		7
	1964	90.2	1		1	3		3	2		2	4		4	4		4	3		3	3		3	5		5
	1965	91.6	2		2	2		2	2		2	6		6	3		3	4		4	4		4	7		7
	1966	92.5	1		1	2		2	1		1	0		0	1		1	1		1	2		2	3		3
	1967	89.3	2		2	2		2	2		2	3		3	3		3	3		3	5		5	3		3
	1968	91.5	1		1	1		1	0		0	1		1	2		2	3		3	2		2	1		1
	1969	93.0	0		0	2		2	1		1	2		2	2		2	6		6	6		6	6		6
Tallahassee	1960	89.7	0	1	1	0	0	0	1	1	2	2	2	4	1	2	3	3	2	5	5	1	6	4	1	5
	1961	90.5	0	0	0	0	0	0	0	0	0	1	1	2	3	2	5	4	3	7	6	4	10	3	5	8
	1962	92.5	0	0	0	0	0	0	1	1	2	1	2	3	3	1	4	1	3	4	3	3	6	2	5	7
	1963	90.8	3	1	4	1	1	2	3	0	3	3	0	3	4	0	4	3	6	9	1	3	4	3	2	5
	1964	88.8	2	0	2	3	0	3	1	2	3	2	1	3	5	1	6	3	1	4	2	3	5	7	3	10
	1965	90.8	0	0	0	0	0	0	2	3	5	5	3	8	5	4	9	2	5	7	2	1	3	3	1	4
	1966	92.9	1	1	2	1	1	2	2	1	3	2	1	3	0	1	1	2	3	5	2	4	6	2	1	3
	1967	89.8	0	2	2	0	1	1	3	2	5	6	2	8	8	4	12	7	4	11	6	2	8	5	2	7
	1968	91.9	0	1	1	0	0	0	0	1	1	2	1	3	2	1	3	3	0	3	2	2	4	2	0	2
	1969	91.0	3	2	5	4	1	5	6	2	8	5	2	7	6	4	10	7	2	9	7	1	8	6	4	10
Troy	1960	91.8	0		0	1		1	0		0	2		2	2		2	1		1	0		0	1		1
	1961	90.0	0		0	0		0	0		0	0		0	0		0	1		1	2		2	2		2
	1962	93.7	0		0	1		1	1		1	0		0	1		1	3		3	2		2	3		3
	1963	89.8	1		1	1		1	1		1	2		2	1		1	3		3	4		4	4		4
	1964	86.3	1		1	3		3	2		2	2		2	2		2	2		2	2		2	0		0
	1965	88.8	1		1	2		2	2		2	2		2	2		2	1		1	2		2	5		5
	1966	91.9	1		1	0		0	0		0	0		0	1		1	2		2	2		2	3		3
	1967	87.4	0		0	0		0	0		0	4		4	4		4	6		6	2		2	4		4
	1968	90.1	2		2	2		2	1		1	1		1	1		1	2		2	3		3	3		3
	1969	91.5	0		0	0		0	1		1	3		3	2		2	4		4	5		5	5		5

Station	Year	Mean July Max. Temp.	A.M. 8-9 M	T	MT	9-10 M	T	MT	10-11 M	T	MT	11-12 M	T	MT	P.M. 12-1 M	T	MT	1-2 M	T	MT	2-3 M	T	MT	3-4 M	T	MT
Tylertown	1960	96.8	0		0	0		0	0		0	0		0	1		1	1		1	3		3	5		5
	1961	90.3	0		0	1		1	0		0	1		1	1		1	3		3	5		5	6		6
	1962	96.6	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0		0
	1963	92.7	0		0	0		0	0		0	0		0	0		0	2		2	2		2	2		2
	1964	91.2	0		0	2		2	3		3	2		2	1		1	1		1	3		3	6		6
	1965	95.3																								
	1966	92.1	0		0	0		0	1		1	2		2	2		2	4		4	3		3	5		5
	1967	88.8	1		1	2		2	2		2	2		2	3		3	0		0	2		2	1		1
	1968	92.0	0		0	0		0	1		1	0		0	1		1	1		1	1		1	2		2
	1969	92.9	0		0	0		0	3		3	1		1	2		2	1		1	1		1	1		1
Vermilion	1960	94.6	1		1	0		0	1		1	3		3	1		1	1		1	1		1	2		2
	1961	89.3	3		3	4		4	3		3	3		3	6		6	4		4	3		3	1		1
	1962	92.5	1		1	0		0	0		0	0		0	2		2	0		0	1		1	1		1
	1963	89.8	2		2	2		2	3		3	4		4	9		9	7		7	4		4	3		3
	1964	88.1	3		3	4		4	4		4	4		4	3		3	1		1	1		1	1		1
	1965	90.2	1		1	1		1	2		2	6		6	7		7	4		4	3		3	2		2
	1966	90.2	4		4	4		4	3		3	1		1	2		2	3		3	4		4	3		3
	1967	89.2	2		2	3		3	3		3	5		5	5		5	5		5	3		3	4		4
	1968	88.8	2		2	0		0	1		1	3		3	1		1	1		1	1		1	1		1
	1969	90.4																								
Wiggins	1960	95.1	0		0	0		0	0		0	0		0	3		3	3		3	5		5	3		3
	1961	92.4	0		0	0		0	0		0	2		2	2		2	2		2	2		2	0		0
	1962	95.4	0		0	0		0	0		0	0		0	0		0	0		0	0		0	2		2
	1963	92.9	0		0	0		0	1		1	1		1	5		5	6		6	6		6	4		4
	1964	90.9	0		0	1		1	1		1	0		0	2		2	2		2	2		2	1		1
	1965		3		3	3		3	2		2	1		1	2		2	3		3	3		3	5		5
	1966	94.8																								
	1967	90.0	2		2	2		2	1		1	2		2	5		5	6		6	7		7	7		7
	1968	93.4	0		0	0		0	0		0	0		0	3		3	2		2	3		3	2		2
	1969	94.2	0		0	1		1	2		2	2		2	1		1	3		3	2		2	3		3

Station	Year	Mean July Max. Temp.	A.M.												P.M.											
			8-9			9-10			10-11			11-12			12-1			1-2			2-3			3-4		
			M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT	M	T	MT
Woodville	1960	95.7	0		0	0		0	0		0	2		2	2		2	2		2	1		1	0		0
	1961	88.9	0		0	0		0	2		2	2		2	2		2	2		2	3		3	5		5
	1962	94.9	0		0	0		0	0		0	0		0	0		0	0		0	0		0	1		1
	1963	91.7	0		0	1		1	1		1	2		2	0		0	1		1	4		4	4		4
	1964	89.3																								
	1965	91.7	2		2	1		1	2		2	0		0	0		0	2		2	3		3	6		6
	1966	92.3																								
	1967	87.9	3		3	2		2	3		3	2		2	3		3	4		4	1		1	6		6
	1968	90.1	0		0	0		0	2		2	3		3	1		1	2		2	4		4	3		3
	1969	92.6	1		1	1		1	2		2	3		3	4		4	2		2	1		1	3		3

M = Measurable T = Trace MT = Measurable-Trace

Calculated from <u>Local Climatological Data</u>, and, <u>Hourly Precipitation Data</u>

Appendix VIII

AVERAGE MAXIMUM TEMPERATURE FOR MEASURABLE RAINFALL OCCURRENCES AND NON-MEASURABLE DAYS: (t) VALUES

STATIONS	A.M. Hour Ending at				P.M. Hour Ending at			
	9	10	11	12	1	2	3	4
Inland								
Alexandria				3.90*	2.53	1.45	1.09	2.15
Bainbridge		37.00*	3.91	3.43	3.36	1.11	1.28	.83
Baton Rouge		5.04	6.82*	5.08	5.31	2.58	1.98	3.04
Brookhaven		4.44	7.06*	3.63	2.69	2.08	2.20	2.44
Clinton	2.80	3.24	2.89	4.29*	1.15	2.36	0.90	1.07
Collins		5.75*	3.16	2.83	1.44	1.76	1.98	1.68
Crestview	1.75	1.14	2.37*	2.06	1.83	1.75	1.40	1.85
Jackson		2.49*	1.64	1.09	2.43	1.13	1.22	.72
Lafayette		4.38	4.72*	3.12	3.05	3.14	2.01	1.15
Meridian				3.00*	1.53	2.26	1.13	2.03
Mobile	5.73	6.68*	3.69	3.80	2.73	1.62	2.14	2.54
Saucier	32.00*	2.83	2.62	2.99	3.37	2.82	1.58	1.57
Tallahassee	3.72	3.12	7.69	7.00	7.70*	4.19	3.29	2.57
Troy		2.53	7.23*	3.28	2.86	1.44	0.79	1.13
Tylertown		1.59	2.75*	1.57	1.78	1.85	0.83	0.73
Wiggins				0.55	1.15	1.47*	0.44	0.38
Woodville	1.04		3.25*	2.63	1.59	1.61	0.11	1.85
Coastal								
Apalachicola	4.70	7.49*	5.16	4.36	2.92	3.15	2.73	0.79
Burrwood	2.75	3.32	4.90	5.02*	2.92	2.18	2.73	0.57
Ft. Morgan	2.43*	1.62	1.08	0.61	0.40	0.02	0.94	0.16
Lake Arthur	0.68	0.60	1.58*	1.06	0.83	0.42	0.12	0.30
Morgan City	2.89*	0.93	0.72	0.99	1.03	1.52	1.68	1.08
New Orleans		3.23	4.80	6.06*	4.41	3.69	2.77	2.21
Pensacola		5.06*	3.28	1.54	2.15	0.40	0.38	1.30
Vermilion	0.74	1.16	1.28*	0.46	0.56	0.75	0.65	0.75

* Highest (t) Value

Calculated from <u>Climatological Data</u> and <u>Hourly Precipitation</u>

Appendix IX

AVERAGE MAXIMUM TEMPERATURE FOR TRACE RAINFALL OCCURRENCES AND NO-RAINFALL DAYS: (t) VALUES

STATIONS	A.M. Hour Ending at				P.M. Hour Ending at			
	9	10	11	12	1	2	3	4
Inland								
Alexandria		2.04	1.69		3.83	7.90*	0.37	0.70
Baton Rouge		4.62*	4.31	4.27	4.00	4.42	4.30	1.57
Jackson				1.19*	1.06	0.83	0.55	0.49
Meridian				3.02*	1.28		1.77	0.38
Mobile		3.79	4.06	4.60*	3.53	2.00	0.25	1.44
Tallahassee	6.60*		2.18	4.19	4.23	6.20	3.08	2.55
Coastal								
Apalachicola		2.04	3.02	0.64	4.35*	3.22	5.03	2.65
New Orleans				3.67	3.98*	2.86	1.96	2.42
Pensacola			0.98	0.59	0.14	4.19	4.81*	0.97

*Highest (t) Value

Appendix X

AVERAGE MAXIMUM TEMPERATURE FOR MEASURABLE AND TRACE RAINFALL OCCURRENCES AND NO-RAINFALL DAYS: (t) VALUES

STATIONS	A.M. Hour Ending at 9	10	11	12	P.M. Hour Ending at 1	2	3	4
Inland								
Alexandria	1.19	2.71	2.43	3.74	5.32*	2.35	1.51	2.36
Baton Rouge	2.44	5.07	4.35	5.68*	5.45	5.15	2.81	2.98
Jackson	4.18*	3.78	3.48	1.91	2.85	2.21	1.25	0.78
Meridian		11.56*	3.58	3.07	2.37	2.34	1.40	1.22
Mobile	5.60	6.72*	5.29	5.34	4.05	2.29	1.88	2.18
Tallahassee	4.91	4.70	7.15	8.75	9.22*	7.20	5.08	3.76
Coastal								
Apalachicola	5.89	7.03*	5.29	4.49	4.68	4.76	5.07	3.04
New Orleans	6.06	5.32	5.31	6.17*	5.01	4.40	2.45	2.59
Pensacola	3.35	5.20*	2.75	2.97	1.66	1.01	0.94	0.38

* Highest (t) Value

Appendix XI

RADAR DETECTED CELLS FROM NEW ORLEANS, LOUISIANA AND APALACHICOLA, FLORIDA: July 1965

Station	Mean Maximum Temperature	10:00 a. m. Number of cells within radii of: 5	10	15	20 (miles)
Louisiana					
Baton Rouge	91.5	2	5	8	12
Clinton	93.7	1	4	7	9
Lafayette	90.0	0	0	3	9
Melville	90.9	0	0	3	6
New Iberia	91.6	2	4	8	13
New Roads	92.9	2	4	6	8
Mississippi					
Bay Springs	91.8	0	1	1	4
Brookhaven	91.5	0	0	2	5
Collins	90.4	0	1	2	4
D'Lo	92.5	0	1	2	5
Hattiesburg	93.4	1	2	3	6
Laurel	92.7	0	1	2	6
Meadville	94.1	0	0	1	5
Merrill	93.5	2	5	11	17
Monticello	93.4	0	0	5	7
Richton	91.7	2	5	9	13
Saucier	91.6	0	2	6	12
Waynesboro	91.4	2	2	3	6
Alabama					
Bay Minette	90.3	1	3	5	14
Citronelle	91.7	0	3	6	12
Mobile	91.0	0	3	6	16
Robertsdale	90.1	2	8	14	20
Florida					
Quincy	88.4	4	9	20	37
Tallahassee	90.8	7	11	23	37
Wewahitchka	93.5	2	7	12	17

Appendix XI-continued

Station	Mean Maximum Temperature	Noon Number of cells within radii of: 5	10	15	20(miles)
Louisiana					
Alexandria	93.8	0	1	4	5
Baton Rouge	91.5	0	4	9	11
Bunkie	93.5	0	1	5	7
Clinton	93.7	0	2	2	9
Elizabeth	94.5	0	0	1	3
Jonesville	93.9	0	2	3	4
Lafayette	90.0	3	6	9	16
Melville	90.9	1	4	9	15
New Iberia	91.6	2	5	7	12
New Roads	92.9	0	3	8	11
Oberlin	94.3	0	1	1	1
Rayne	93.6	0	1	4	11
Ville Platte	93.2	0	2	9	14
Mississippi					
Bay Springs	91.8	0	2	6	10
Brookhaven	91.5	0	3	9	13
Collins	90.4	3	3	10	13
Laurel	92.7	2	6	13	18
Liberty	93.9	2	2	4	7
Meadville	94.1	0	1	5	10
Quitman	91.6	3	7	9	17
Saucier	91.6	2	4	10	14
Waynesboro	91.4	2	5	10	17
Whatley	92.5	2	3	7	9
Woodville	91.7	0	3	6	8
Alabama					
Andalusia	91.3	3	9	20	24
Bay Minette	90.3	0	1	3	10
Citronelle	91.7	1	3	8	15
Mobile	91.0	1	4	11	20
Robertsdale	90.1	3	7	15	23
Troy	88.8	2	6	11	19
Florida					
Crestview	90.3	4	14	23	45
Quincy	88.4	7	15	29	40
Tallahassee	90.8	3	13	25	36
Wewahitchka	93.5	3	5	12	18

Appendix XI - continued

Station	Mean Maximum Temperature	Noon-continued Number of cells within radii of: 5	10	15	20(miles
Georgia					
Bainbridge	89.4	2	13	26	48
		2 p.m.			
Florida					
Milton	90.3	2	6	10	14
Quincy	88.4	0	5	9	14
Tallahassee	90.8	4	7	16	24
Troy	88.8	0	0	2	3
Georgia					
Bainbridge	89.4	2	6	12	16
Louisiana					
Baton Rouge	91.5	3	6	14	23
Clinton	93.7	4	10	19	32
Lafayette	90.0	1	11	18	27
Melville	90.9	0	4	10	19
New Iberia	91.6	3	10	24	37
New Roads	92.9	4	11	15	27
Mississippi					
Brookhaven	91.5	4	11	17	35
Meridian	90.5	1	4	6	15
Saucier	91.6	4	11	19	32

Appendix XII

MEAN JULY MAXIMUM TEMPERATURE FOR THE PERIOD 1960-1969 AND THE EFFECT OF CONVECTIVE RAINFALL: A "t" TEST

Significant (t) and (r) Value in the Same Hour		Significant (t) and (r) Value Not in the Same Hour	
Station	Mean July Maximum Temperature 1960-1969	Station	Mean July Maximum Temperature 1960-1969
Alexandria	91.9	Bainbridge	92.6
Baton Rouge	91.6	Crestview	92.0
Brookhaven	91.0	Jackson	92.1
Clinton	92.9	Tylertown	92.8
Collins	91.5		
Lafayette	90.6		
Meridian	92.3		
Mobile	91.5		
Saucier	92.0		
Tallahassee	90.9		
Troy	90.1		
Woodville	91.5		

t = 3.21

"t" table value for 4 degrees of freedom at 95 per cent = 2.132