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THE FLOOD OF APRIL 1974 IN SOUTHERN MISSISSIPPI AND SOUTHEASTERN LOUISIANA

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FLOOD OF MID-APRIL 1974 IN SOUTHERN MISSISSIPPI AND SOUTHEASTERN LOUISIANA

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ABSTRACT

The flood of April 1974 over the Pascagoula and Pearl River Basins in southern Mississippi and southeastern Louisiana ranks among the most severe in terms of crest stages and maximum flood discharges reached. Record or near-record flooding occurred at many sites. This flood was mainly the result of a storm that covered Louisiana, Mississippi, and western Alabama on April 11-15, 1974, with the heaviest precipitation over southern Mississippi. Significant incursion of tropical maritime air mass into the region occurred prior to and during the storm. The broad synoptic-scale situation associated with the precipitation was an occluded Low centered over the Midwest together with its frontal system. The major portion of the storm precipitation, however, was due to mesoscale squall line severe storms that developed in the moist environment of the warm sector ahead of the front. Amounts exceeding the 100-yr rainfall were observed at some places in southern Mississippi and at least one site in Louisiana. Flood discharges at several gaging sites along these two river systems also established new records.

INTRODUCTION

Widespread rain fell over Louisiana, Mississippi, and western Alabama in the period April 11-15, 1974. Heaviest rain fell from April 12 through 14 in a band across southern Mississippi, where amounts ranged up to 20 in. Rivers and streams rose rapidly. Major floodings with record-breaking peaks and discharges were reported along the Pearl and Pascagoula Rivers and their tributaries. Eight deaths were reported. Damage in southern Mississippi was estimated to exceed $12 million, and a total of 20,000 people were evacuated during the flood (Environmental Data Service 1974a). Timely and accurate flood warnings and flash flood warnings issued by the National Weather Service prevented more loss of life and limited the property loss somewhat in many communities.

The objectives of this report are to present the meteorological events associated with the flood, in particular the precipitation distribution, and to give a concise account of the flood itself. Emphasis will be placed on events in southern Mississippi, where heaviest storm precipitation fell and where flooding was most severe.

The Pearl and Pascagoula River Basins occupy central and southern Mississippi and a small portion of southeastern Louisiana (figs. 1a and 1b). The terrain consists of a flat coastal plain along the Gulf of Mexico rising gradually northward. Elevation reaches 100 ft (30 m) about 30 mi (48 km) from the Gulf but never exceeds 500 ft (152 m) even in the hilly headwater regions of these two rivers. The climate is characterized by abundant and well distributed rainfall, mild winters, and warm humid summers. Thunderstorms may occur any time of the year but are most common in the summer. Almost all precipitation reaching the ground is in liquid state, except when a rare winter snow storm occurs. Normal annual precipitation averaged over the two-basin area is about 58 in. (1,473 mm), while normal monthly precipitation in April is about 5.5 in. (140 mm) (Environmental Data Service 1968). Average annual runoff varies from 18 in. (457 mm) in the headwater regions, increasing southward, to more than 30 in. (762 mm) near the mouth of the Pearl and Pascagoula Rivers (U.S. Geological Survey 1970). Historically, these two river basins are not particularly flood prone.

Precipitation over southern Mississippi in March 1974 was close to normal (Environmental Data Service and Statistical Reporting Service 1974). Analysis of cummulative precipitation in the 10-day period immediately before the storm also reveals no unusual anomaly. Laurel, Miss., and Shubuta, Miss., received 3.87 and 3.40 in. (98 and 86 mm) respectively in that period, but the areal average rainfall over the region between April 1-10, 1974, was only about 1.5 in. (38 mm). The Palmer Index valid for April 9, 1974, over the region (Environmental Data Service and Statistical Reporting Service 1974) indicated near normal or moderately wet long-term conditions. However, when considering the antecedent stream flows, the daily discharge hydrographs for stations in the Pearl and Pascagoula Basins were generally on their recession curves and were at or near their respective monthly minima just prior to the onset of storm runoff (fig. 15). From all these considerations, it seems likely that antecedent events did not have a positive impact on the initiation and magnitude of the flood.

METEOROLOGICAL SETTINGS

General Weather Situation

On April 9, 1974, the Pearl and Pascagoula River Basins, which occupy southern Mississippi and a small section of east-central Louisiana (henceforth, the "region of interest" or the "region"), were near the center of a high-pressure system. It had clear, cool, and dry weather with a surface dew point generally less than 40°F (4.4°C). Wind was light and northerly. Then the High progressed towards the northeast, and by 0600 CST April 10, it was centered over the Ohio-Kentucky area. Meanwhile, a low-pressure system, which developed over the lee of the Rockies, deepened and extended its circulation to cover the whole Western United States. This configuration of the pressure systems caused the boundary layer wind over the Louisiana-Mississippi area to shift into a southeasterly direction.

The high-pressure system over the Eastern United States became well established by the morning of April 10. As this system persisted, the circulation and air mass characteristics over the Gulf of Mexico underwent significant changes. These changes were reflected in the meteorological observations at the NOAA environmental data buoy EB-10 (27°28.5'N, 88°01.5'W) located in the gulf about 200 km south-southeast off the Mississippi Delta coast (fig. 1a). The evaluation of the observed wind at EB-10 (fig. 2) indicated a shift in direction from easterly to southerly and a significant increase in speed between April 10 and 11. This was accompanied by a pronounced increase in dew point from April 10 onward, together with a moderate but continuous rise in air temperature. These signs indicated that the tropical maritime air mass that originated in the Carribean Sea was being brought into the gulf. The mixing ratio at EB-10 at 0000 CST April 10 was 8.2 g/kg, but it more than doubled to reach a value of 17.7 g/kg by noon April 12. As advection of the moisture-laden air continued further into the region, the moisture parameters at many stations changed accordingly. For example, the coastal station Boothville, La., had a maximum persisting 12-hr dew point reduced to 1000 mb of 70.5°F (21.4°C) on April 12. This was a high value in view of the fact that the maximum observed dew point of record in April there was about 75°F (23.9°C) (Environmental Data Service 1968). Further inland at McCone in southern Mississippi, the dew point increased from 54°F (12.2°C) to 67°F (19.4°C) in the 24-hr period ending at 0600 CST April 12. This high moisture level was maintained afterwards.

The highlights of the evolution of the synoptic situation from 0600 CST April 11 to 1800 CST April 14, 1974, are depicted in figures 3a-h, showing surface Lows and frontal systems and 500-mb contours. By 0600 CST April 12, the Low which first originated in the lee of the Rockies was located over Nebraska-Iowa, with a cold front extending southward close to the region of interest. This major weather system provided the setting for what followed. The region was also located to the east of the upper air long-wave trough during the period of April 11 to the morning of April 14. Cloud cover photographs from a NOAA satellite for 1100 CST April 12-13 are shown in figure 6. The superposed surface front and squall line represents positions 5 hr earlier.

At Jackson, Miss., located further inland and just to the north of the precipitation center, the moist layer extended only up to 500 m at 0600 CST April 11 (fig. 4a). Above this lay a deep layer of much drier air. This moist lower layer gradually increased in depth as the inflow from the gulf continued. It had extended to 2600 m 12 hr later (fig. 4b) and then completely displaced the dry air by 0600 CST April 12 (fig. 4c). By this time, the moist air incursion had covered major portions of Louisiana-Mississippi and caused significant increase in precipitable water there to values exceeding 1 in. (2.54 cm) (fig. 3c).

The presence, over the region of interest, of a deep moist layer of tropical maritime origin provided the necessary and indispensable prerequisite if heavy rain was to occur. Lott and Myers (1956) showed that large-volume cold-season rainstorms in the Central Mississippi Valley were always supported by an inflow of tropical air.

Although the actual initiation of precipitation depends on the atmospheric dynamics interacting with cloud microphysics, it is empirically observed that the amount of atmospheric water content does have a positive bearing on the amount of precipitation if the latter occurs. In this storm, the area that received more than 12 in. (305 mm) of rain (fig. 8) is well enveloped by an area where the precipitable water consistently exceeded 1 in. (254 mm) at 0600 CST April 12-14 (figs. 3c-3e).

Jackson, Miss., also underwent a progressive cooling at 700 mb, manifested by a temperature drop of 8.7°C in 24 hr ending at 1800 CST April 12. Possibly, in some measure, as a result of this process, the 0600 CST April 12 sounding displays the formation of a layer just below 700 mb with a lapse rate exceeding that of the dry adiabatic (fig. 4c).

For southern Mississippi as a whole, moderate cooling in the 700- to 500-mb layer was observed in the 12-hour period ending 0600 CST April 12. The wind field profile over the region on April 12 showed that cold advection in the 700- to 500-mb layer generally occurred over warm advection. This differential advection tends to destabilize the local thermal structure progressively.

Surface and 850-mb analyses for 1800 CST April 12, a map time close to the occurrence of the most intense rainfall in southern Mississippi, are shown in figures 5a and 5b. At 1800 CST April 12 relatively strong wind existed over southern Mississippi. At Jackson, Miss. (fig. 4d), the wind at 7,000 ft (2,134 m) was 31 kt (57 km/hr) and increased to 79 kt (146 km/hr) around 8,000 ft (2,438 m) and to 93 kt (172 km/hr) around 9,000 ft (2,743 m), all from the west. At 11,000 ft (3,353 m), it reduced to 48 kt (89 km/hr) and the direction backed to 248, indicating local cold advection above 9,000 ft (2,743 m). It is likely that the wind intensified for a considerable period prior to the time of sounding, but this cannot be verified due to lack of intermediate data. The existence of strong wind and wind shear in the middle level is usually associated with a baroclinic region.

Stability and Synoptic Scale Rising Motion

The K Index (George 1960) is a measure of the air mass moisture content and static stability and is given by:

$$K = (T_{850} - T_{500}) + T_{d,\,850} - (T_{700} - T_{d,\,700}),$$

where T is temperature, T_d, the dew point (both in degrees Celsius), and the subscripts denote pressure levels in mb. The larger the K Index of the air mass, the more unstable it is. A K Index greater (less) than 35 (20) is associated with numerous (no) thunderstorms.

A detailed K-Index analysis for 0600 CST April 12 over Louisiana-Mississippi using analyzed 850-, 700-, and 500-mb data indicates K Index values exceeding 30 consistently over the region of interest. This unstable condition in the atmosphere provided another favorable condition for thunderstorms to occur if lifting was initiated. In fact, the surface weather observation at Jackson, Miss. shows that showers had begun in the early morning of the 12th.

Another stability index useful for severe thunderstorm forecasts is the Total Totals Index TT (Miller 1972) given by:

$$TT = T_{850} + T_{d,\,850} - 2T_{500}$$

A recent investigation by Alaka et al. (1973) suggested the following set of favorable conditions for severe thunderstorms to occur in spring:

1. Total Totals Index greater than 50.
2. Boundary layer potential temperature greater than 32°C.
3. Absence of a tendency towards increasing stability from the material differential advection.
4. Rising motion at 650 mb greater than 1×10^{-6} mb/s.
5. Cyclonic vorticity in the boundary layer.

Prior to the onset of the first major rain burst, the 0600 CST April 12 sounding at Jackson, Miss., indicated a Total Totals Index of 43 and a mean potential temperature from the surface to 950 mb of 16°C. Therefore, conditions 1 and 2 were not met. However, surface and upper air analyses showed that conditions 3 through 5 were satisfied over southern Mississippi. Indeed, in reference to condition 3, there was a tendency towards decreasing stability over the region due to differential advection. This situation should have contributed positively towards the subsequent storm development.

The 12-hr surface pressure changes over southern Mississippi for 1800 CST April 11 and two subsequent 12-hr intervals were approximately -5 mb +2 mb, and -2 mb, respectively. By 1800 CST April 12, a surface trough over southern Louisiana and Mississippi formed in the environment of conditionally unstable moist air, and the line of thunderstorms became aligned with the trough.

At 0600 CST April 12 when the most intense rainfall began, an absolute vorticity center exceeding 12×10^{-5}/s was situated over western Texas, with the vorticity isopleth crossing contours at angles greater than 30° (not shown). This configuration of the motion field projects very strong positive vorticity advection over the Louisiana-Mississippi region.

The synoptic scale vertical motion field is a function of the rate of change with height of vorticity advection. Rising motion is associated with the rate of increase with height of positive vorticity advection. Since vorticity advection is usually negligible in lower levels compared to that at 500 mb, strong positive vorticity advection at 500 mb signifies rising motion and convergence in the lower troposphere. This relationship has been well known and the presence of strong positive vorticity advection was the key parameter suggested by Miller (1972) to forecast severe storm development.

The 850-mb 24-hr air parcel trajectory and the 700-mb 12-hr vertical displacement, both valid for 1800 CST April 12, are shown in figure 7. The continued advection of tropical maritime air in the lower layers over the region and the synoptic scale rising motion of incoming air parcels are evident. Specifically, for southern Mississippi, the air parcels arriving at 700 mb at the map time have risen more than 40 mb in the past 12 hr, or at a vertical velocity slightly greater than 1 cm/s. This was the time-averaged vertical velocity. Instantaneous values computed twice daily by the National Meteorological Center six-layer PE model are also available (not shown). Prior to the outbreak of the storm, rising motion exceeding 1 cm/s was prevalent at 700 mb over the region at 0600 and 1800 CST April 11. This rising motion then decreased and at 0600 CST April 13 very weak sinking motion began to appear over the region,but was again replaced by weak rising motion 12 hr later.

Summary of Meteorological Settings

It is well established that smaller scale weather systems occur when and where large-scale conditions are favorable. In the foregoing discussion, we have elucidated the specific synoptic-scale conditions favorable to severe storm development over Mississippi and Louisiana in the middle part of April 1974. These conditions can be briefly summarized as follows:

1. Prior to the storm, a high-pressure system became established over the Eastern United States and the Atlantic seaboard. As this system persisted, the moisture-laden tropical maritime air mass was brought into the region of interest by the prevailing southeasterly wind field over the gulf. Once the moist layer extends its depth to middle level, a prerequisite condition for the occurrence of flood-causing heavy rain was fulfilled.

2. An occluded Low was over the upper Midwest, with the frontal system to the northwest of the region of interest.

3. The evolution of upper air circulation was such that prior to and during most of the storm duration an upper long-wave trough was located to the west of the region which was under a trough-to-ridge contour pattern.

4. The 500-mb motion field had a configuration leading to maximum positive vorticity advection over the region.

5. Synoptic-scale rising motion prevailed at 700 mb over the region prior to the storm outbreak.

6. A thermal structure over the region showing K-index values greater than 30 indicates unstable conditions favorable to thunderstorm development.

7. Cold advection in mid-troposphere overriding warm advection below over southern Mississippi led to a progressively destabilizing process.

8. Surface pressure changes occurred over the region in a manner that a mesoscale trough was formed, and the line of thunderstorms became imbedded in the trough.

Under a combination of all these aforementioned meteorological conditions, a squall line developed and heavy showers began to fall over southern Mississippi in the early morning of April 12. In general, once showers begin to fall, the initial downdraft is strengthened by the density increase in the rainshaft, caused by the evaporative cooling of raindrops. As dense cold air descends and spreads out from the line of cumulonimbus, a local cold front will be created ahead of the squall line. This steep cold front will undercut the lighter and warmer convergent incoming air and lift it to condensation. Thus, the precipitation process is regenerated by the collective action of the existing storm, and persistent showers can be maintained. If such a squall line slows down, showers of long duration would be observed at individual stations. For example, at Raleigh, Miss., rain was observed in each consecutive hour for 19 hr on the 12th.

DISTRIBUTION OF STORM PRECIPITATION

During the period of April 11-15, 1974, heavy rain fell over large areas of Louisiana and Mississippi. An elongated band in southern Mississippi (fig. 8) about 20 mi (32 km) wide and 80 mi (129 km) long oriented approximately east-west received more than 14 in. (356 mm) of rain. This band covered the upper reaches of Oakohay Creek, Okatoma Creek, and Bowie Creek of the Pascagoula River system and a stretch of the Pearl River stem from Rockport, Miss., to Monticello, Miss. (fig. 10). An amount of 20.76 in. (527 mm) was reported at Simpson Fire Tower near Mendenhall and 20.36 in. (517 mm) near Magee, both in Simpson County, Miss., and on the dividing ridges of the two watersheds. Secondary centers were located between Leaf River and Tallahala Creek and near Enterprise, Miss., on the Chickasawhay River. Although a few stations in the two-State area had rain on April 11 and/or April 15, most areas in southern Mississippi experienced their major bursts of storm rainfall within a 30-hr interval ending 1200 CST April 13.

Total storm precipitation distribution is shown in figure 8, and 24-hr amounts ending 0600 CST daily for April 12 through 14 are shown in figure 9. Isohyetal analysis over the Pascagoula-Pearl River Basins is shown in figure 10 and mass rainfall curves for six stations in figure 11. The widespread rainfall was associated with the frontal system and Low centered over the Midwest. The major portion of heavy rain through Louisiana and Mississippi, however, was caused by small-scale convective systems, which developed under favorable synoptic-scale conditions. For example, the mass rain curve for Raleigh, Miss. (fig. 11), located about 15 mi (24 km) east-northeast of the maximum precipitation center, shows three distinct major rain bursts. The first and by far most important major burst produced more than 9 in. (229 mm) of rain in the 19-hr period ending 2300 CST April 12 and was the result of thunderstorm showers from the squall line imbedded in a surface meso-trough. This squall line was oriented in an east-west direction, and stood in the path of inflow of maritime tropical air mass from the gulf (fig. 3d). The second burst, ending on the afternoon of the 13th, was due to convective showers in the moist and conditionally unstable air triggered perhaps by the passing of an upper air short wave in the morning. The last rain burst, ending on the morning of the 14th, was associated with the passage of the cold front. Somewhat similar patterns can be found on the other mass curves. The intense rainfall at Winnfield 2W, La., where 11.2 in. (284 mm) of rain fell in 8 hr ending 0200 CST April 12, came from thunderstorm showers associated with an earlier squall line shown on the surface analysis for 1800 CST April 11.

A bucket survey was conducted over the southern Mississippi area immediately after the storm by the National Weather Service Southern Region, in cooperation with the State authorities, to acquire additional rainfall data. These data are presented in table 1. Storm rainfall data observed at forest lookout stations in Louisiana are shown in table 2. Neither set of these data has been published elsewhere.

A preliminary depth-area-curve for the total storm of April 11-15 over Mississippi and Louisiana is shown in figure 12. The accumulated precipitation volume enclosed within the 6-in. (152 mm) storm isohyets (fig. 8) is estimated to contain more than 12.6 billion cubic meters of water.

The isopluvial gradient of the climatological precipitation frequency curves for the Louisiana-Mississippi region is relatively flat (e.g., Miller 1964). This would permit comparison of observed rainfall amounts from a sample of stations with those predicted by frequency curves at one nearby location. Such a comparison using frequency curves at 32°N, 90°W (fig. 13) derived from Hershfield (1961) and Miller (1964) indicates that for Monticello, Mize, Raleigh, and Brookhaven 2, Miss., and Winnfield 2W, La., rainfall exceeded the 100-yr storms at least for some durations. Because the rain gages at Monticello, Mize, and Dlo, Miss., are of the nonrecording type, daily amounts are necessarily used in this comparison; and, therefore, underrepresentation is possible for some of the shorter duration rainfalls. It should be remembered that these comparisons are based on point probability estimates. An operational procedure for determining the probability of occurrence of major storm rainfall over a large area has yet to be developed.

Comparisons with some previous storms whose precipitation centers were within 100 mi (161 km) of the present center and whose maximum average depths exceeded 5 in. (127 mm) for 10 mi^2 (26 km^2) in 6 hr are shown in table 3. The historic data are compiled from "Storm Rainfall in the United States" (U.S. Army Corps of Engineers 1945--) and should not be construed as exhaustive. The recording rain gage data at Raleigh, Miss., located about 20 mi (32 km) east-northeast of the precipitation center, is used to represent this storm. Due to the orientation of the band of maximum precipitation, the time distribution of precipitation at Raleigh and the rainfall center would be highly correlated, although the amount will be larger at the precipitation center.

THE FLOOD

The runoff from the storm rainfall caused record floods on streams and rivers in southern Mississippi and rural flooding widespread.

Observed maximum discharges during the April 1974 flood (U.S. Geological Survey 1974) versus drainage areas for a sample of gaging stations in the Pascagoula and Pearl River Basins are shown in figure 14. The one data point falling outside the envelope represents Okatoma Creek at Magee. Comparative discharge hydrographs at selected sites in these two basins are shown in figure 15. Daily stages for some sites are shown in figure 16.

In the Pascagoula River Basin, the upper portion of the Leaf River Valley was the most severely affected flood area (Environmental Data Service 1974a). The flood flow of 16,100 cfs (456 m^3/s) on April 13 at a site on Okatoma Creek (drainage area 38 mi^2 or 98 km^2) near Magee was twice as great as the expected 50-yr flood. The flood discharge of 133,000 cfs (3,766 m^3/s) on Leaf River at Hattiesburg (1,760 mi^2 or 4,558 km^2) on April 15 exceeded by 84 percent the modern records established in February 1961. The crest stage of 34.03 ft (10.4 m) (flood stage 22 ft or 6.7 m) surpassed the old record of 33.8 ft (10.3 m) in April 1900. Over 8,000 people were evacuated from Forrest County and the Hattiesburg area, where more than 6 mi^2 (15.5 km^2) was flooded with water 15 ft (4.6 m) deep in places. U. S. Highway 47 was closed north of Hattiesburg. Downstream, at Beaumont (flood stages 22 ft or 6.7 m), the stage of 32.2 ft (9.8 m) on April 17, 1974, was the highest since February 1961. Along the Chickasawhay River crest stages were 7 to 14 ft (2.1 to 4.3 m) over flood stage. The crest of 41.6 ft (12.7 m) at Shubuta (flood stage 30 ft or 9.1 m) on April 16, 1974, was the highest since December 1919. Cattle and timber-cutting operations were hit hard. Tallahala Creek at Laurel, Miss. (flood stage 13 ft or 4 m) overflowed its banks, driving many people from their homes before cresting at 23.28 ft (7.1 m) on April 15, highest since December 1919.

Flood discharges exceeding the 50-yr flood and their corresponding stages were observed in many other sites in the Pascagoula River Basin and are listed as follows. On Oakohay Creek at Mize, Miss. (drainage area 171 mi^2 or 44 km^2), maximum discharge of 28,000 cfs (79 m^3/s) and stage of 17.26 ft (5.3 m) on April 13 were much higher than the previous records of 13,000 cfs (368 m^3/s) and 15.13 ft (4.6 m) on February 21, 1961. On the Leaf River near Collins, Miss. (752 mi^2 or 1,948 km^2), maximum discharge was 52,000 cfs (1,473 m^3/s) on April 13; the stage of 32.43 ft (9.9 m) was the highest since 1856. On Bowie Creek near Hattiesburg, Miss. (304 mi^2 or 787 km^2), maximum discharge of 41,000 cfs (1,161 m^3/s) and stage of 28.18 ft (8.6 m) on the 14th exceeded any flood on record going back to 1938. On Okatoma Creek at Seminary, Miss. (202 mi^2 or 523 km^2), maximum discharge of 31,000 cfs (878 m^3/s) and stage 247.6 ft (75.5 m) on April 13, 1974, surpassed the previous records established on February 21, 1961.

In the Pearl River Basin, the crest of 26.8 ft (8.2 m) on April 15 at Edinburg, Miss. (flood stage 20 ft or 6.1 m) exceeded the modern record set in 1961 by 0.1 in. At Jackson, Miss. (flood stage 18 ft or 5.5 m), the crest was 34.5 ft (10.5 m) on the 19th. The Strong River near Puckett, Miss. (260 mi^2 or 673 km^2), had a stage of 27.86 ft (8.5 m) and a maximum discharge of 25,000 cfs (708 m^3/s) on April 12, both setting new records. This was partially responsible for the fastest rise in history on the Pearl River down stream at Rockport. Further downstream, Monticello and Columbia were hit hard by the flooding river. At Monticello (flood stage 19 ft or 5.8 m), the crest of 32.6 ft (9.9 m) on April 14 was well above the previous modern record of 30.15 ft (9.2 m) on April 8, 1938, but was exceeded by the flood of 1902, which reached 33.45 ft (10.2 m). Because roads and the river bridge were inundated, observation at the peak of the flood had to be made by boat. At Columbia (flood stage 17 ft or 5.2 m) the crest of 27.25 ft (8.3 m) on April 15, 1974, was only exceeded by that occurring in April 100 yr ago. About 2,000 people had to be evacuated in Columbia. At Bogalusa, La. (flood stage 15 ft or 4.6 m), the crest of 22.14 ft (6.7 m) and a maximum discharge of

98,000 cfs (2,775 m^3/s) on April 17 had a recurrence interval greater than 100 yr and exceeded any recorded flood going back to 1938. The April monthly discharge there of 39,980 cfs (1,132 m^3/s) was more than three times the median monthly discharge in the 30-yr period from 1941 to 1970. The Pearl River at Bogalusa remained above flood stage during all of April.

In the Red River Basin in Louisiana, the most intense rain fell at Winnfield, 11.2 in. (284 mm) in 8 hr, ending 0200 CST April 12. The city was flooded when the earthern dam at the outlet of Spillway Lake gave way at about 0230 CST on the 12th, releasing about 130 million gallons (492,050 m^3) of water into Sonnet Creek. Many streets were damaged and two culverts were washed out. Many small stream floodings occurred in central Louisiana; however, the major Red River did not rise above flood stage; neither did the Ouachita River. Minor flooding also occurred along the Tombigbee River and its tributary Black Warrior River in western Alabama in the middle part of April 1974. Flood stages at a sample of sites in southern Mississippi, southeastern Louisiana, and western Alabama are shown in table 4.

SOME CONCLUDING REMARKS

The flood of April 1974 in southern Mississippi and southeastern Louisiana has been described, and its associated meteorological setting and precipitation distribution have been presented. It has been shown that heavy rain fell over southern Mississippi and parts of Louisiana under a set of meteorological conditions that produced a near optimum combination of high atmospheric moisture content, low-level convergence, static and dynamic instability, and synoptic-scale rising motion. As a storm evolves, a change in one or more of these conditions will destroy this combination. For example, rising motion was replaced by sinking motion over the region on the morning of April 13; by the afternoon of that day, the southerly wind at NOAA buoy EB-10 noticeably slackened (fig. 2), indicating a reduced rate of moist air inflow into the region. By 1800 CST April 14, the cold front had passed the major portion of the region, the 500-mb pattern had become zonal (fig. 3h), and the storm ended.

The set of predictors proposed by Alaka et al. (1973) was objectively selected by a screening regression procedure with the occurrence of intense line echoes (as depicted on radar summary maps) as the predictand. Such predictors would have high relevance for the "general" cases. However, suppose there exists a certain environmental condition, say, condition A, which is observed only rarely, but, if observed, a severe storm will certainly follow. Then, condition A, which is sufficient but not necessary, could serve as an excellent forecasting tool. However, if a few such rare cases are grouped with a large number of others when severe storms have occurred without the realization of condition A, this potentially excellent predictor may be completely masked in the screening regression process. This hypothetical example illustrates the continuing need of diagnostic studies. Extreme events will continue to be caused by unusual combinations of meteorological factors that will not be predicted by statistical procedures.

The synoptic observation network has a characteristic spacing of 300 km between rawinsonde stations, and profiles of pressure, temperature, moisture, and wind are measured at 12-hr intervals. These data form the basis for all numerical analysis and forecasting. Despite being supplemented by denser and more frequent surface observations, the synoptic network cannot be expected to resolve small-scale weather systems such as the air-mass thunderstorm, which is two orders of magnitude smaller and has a characteristic time scale of 1 hr. Neither can the network easily resolve the squall line severe storm, whose characteristic length approaches the grid spacing. In order to reveal the actual generative mechanism and the detailed life cycle of the squall line and to explain why its activity was most intense over a restricted region in southern Mississippi when large-scale environmental conditions were favorable to its development over a much wider area, subsynoptic-scale meteorological observations are necessary. For example, the National Severe Storm Laboratory has a mesonetwork designed to monitor severe storms with rawinsonde stations spaced 30 km apart over a limited region in southwestern Oklahoma and serial releases are made at 1-hr intervals during some of its operations.

The analysis presented in this report, however, clearly illustrates again the controlling influence exerted by the synoptic conditions on the occurrence of smaller scale weather systems and illuminates some of the more important conditions associated with the development of the severe storm responsible for the flood of April 1974 over southern Mississippi and southeastern Louisiana.

ACKNOWLEDGMENTS

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Table 1.--Supplementary rainfall data for Mississippi for April 11-15, 1974

Location	Lat. N ° ' "	Long. W ° ' "	Rainfall (in.)	Date	Time (CDT)	Type of rain gage or container	Accuracy	Remarks
Adams Co.								
Natchez 3SE	31 30	91 22	6.06	12				
			6.55	13				
			0.77	14				
Anite Co.								
Crosby	31 16 37	91 03 00	9.0+	11-14		6-in. wedge	Poor	
Liberty	31 12	90 46	.85	12				
			4.51	13-14				
Claiborne Co.								
Alcorn A&M College	31 52 07	91 08 05	8.30	12		Cylinder within a cylinder,	Good	
			3.30	13		inner one 2-in. diameter		
Hermanville 5E	31 55 05	90 47 01	7.00	12		4-in. gage	Good	
			3.50	13				
Pattison	31 93 05	90 53 02	6.20	12		4-in. gage	Good	
			3.00	13				
			2.00	14				
Port Gibson 9NE	32 03	90 56	.06	12				
			1.67	13				
			1.97	14				
Clark Co.								
Enterprise 2SSW	32 09	88 51	3.4	12		Fence post	Good	
			9.8	13				
			3.4	14				
Shubuta 8NNE	31 58	88 37	.80	12				
			4.62	13				
			1.43	14				
Copiah Co.								
Carpenter 1.2S	32 02	90 42	8.31	12-14		Standard 8-in. gage	Good	
Crystal Springs 8SE	31 55	90 15	6.25	12-14		5-in. wedge	Good	
Dentville	31 57 07	90 33 04	4.00	12		4-in. gage	Good	
			4.00	13	7 p.m.			
			1.50					
Dentville 1SE	31 57 02	90 34 00	2.40	12		Taylor Instrument 5-in.	Good	
			6.00	13		gage		
			2.35	14				
Hazelhurst 6SE	31 49	90 19	6.5	12-14		5-in. gage	Fair	
Hazelhurst 9.5SE	31 46	90 17	10.50	12-14				
Hazelhurst 16.6SW	31 45	90 39	12.05	12-14		Standard 8-in. gage	Good	
Hazelhurst 12NW	31 52	90 33	10.95	12-14		Taylor Instrument 5-in.	Good	
						gage		
Glaney	31 48 02	90 30 00	3.5	12		4-in. gage	Good	
			3.5	13				
			1.0	14				
Peetsville 0.5E	31 42 08	90 32 08	10.0	12		4-in. gage		
			3.5	13				

Table 1--Continued

Location	Lat. N ° ' "	Long. W ° ' "	Rainfall (in.)	Date	Time (CDT)	Type of rain gage or container	Accuracy	Remarks
Copiah Co. Continued								
Pleasant Hill, Union Church	31 43 08	90 43 08	4.7	12	6 a.m.	5-in. gage		
			4.8	13	7 a.m.			
			3.0	14	Noon			
Utica 6SW	32 02	90 41	1.89	12	7 a.m.			
			2.73	12	2 p.m.			
			.40	13	7 a.m.			
			.67	13	11 a.m.			
			1.45	14	9 a.m.			
Covington Co.								
Collins 0.5SE	31 28	89 34	7.19	12-14		Standard 8-in. gage	Good	
Mt. Olive 5W	31 46	89 44	10.0+	12-14		5-in. glass tube	Fair	Amount estimated.
Sanford 2S	31 27	89 25	7.75	12-14		Glass fence post type	Good	
Forest Co.								
Hattiesburg 1N	31 20	89 20	7.60	12-14		Straight garbage can	Fair	
Hattiesburg 10SSE	31 15	89 16	5.14	13				
			5.14	14				
			.67	15				
Hattiesburg 1.5NW			7.0+	12-14		Plastic wedge	Fair	
Franklin Co.								
Bude Fire Tower	31 24 07	90 50 08	6.00	13	2 p.m.	NWS recording gage	Good	
			6.28	14	10 a.m.			
Meadville 5W	31 28 08	90 59 02	.13	12	2 p.m.	2.5-in. type gage	Good	
			11.17	13	2 p.m.			
			1.20	14	Noon			
George Co.								
Lucedale 4W	30 54	88 40	3.08	12-13				
			5.10	14				
			1.19	15				
Merrill 8SE	30 54	88 35	4.79	12-15				
Greene Co.								
Leaksville 9WNW	31 11	88 40	6.82	13				
			5.82	14				
			2.15	15				
Itancock Co.								
Bay St. Louis 12NNW	30 27	89 27	5.42	13				
			.45	14				
			1.45	15				
Standard 5SW	30 38	89 30	7.32	13-15				
Harrison Co.								
Gulfport 14N	30 36	89 07	5.30	12-15				
Hinds Co.								
Edwards	32 21 03	90 37 04	6.00			Tube type	Fair	
Jackson 1NW	32 18	90 11	6.00	12-15		Unknown		

Table 1--Continued

Location	Lat. N ° ' "	Long. W ° ' "	Rainfall (in.)	Date	Time (CDT)	Type of rain gage or container	Accuracy	Remarks
Hinds Co. Continued								
Oakley 1.25SSW	32 12 05	90 30 46	6.35	12-15		Standard 8-in.	Good	
Raymond nr.	32 12 05	90 30 46	1.49	13	8 a.m.	Standard 8-in.		
			3.86	14	8 a.m.			
			1.00	15	8 a.m			
Raymond 3SE	32 14	90 22	4.56					
South Jackson	32 17 00	90 13 03	5.80			Tube type	Good	
Terry	32 06 00	90 18 02	10.50			Minnow bucket	Fair	
Jasper Co.								
Rose Hill 1N	32 09	89 00	5.5	12-14		Glass fence post	Fair	
Paulding nr.	32 02	89 02	.02	12	7 a.m.	Standard 8-in.	Good	
			8.57	13	7 a.m.			
			1.25	14	7 a.m.			
			.34	15	7 a.m.			
Rose Hill 4SW	32 05 47	89 02 45	3.98	12				
			4.15	13				
			1.00	14				
Jefferson Co.								
Fayette 7E	31 41 00	90 55 09	7.50	13	7 p.m.	Farmer coop test tube	Good	
			1.60	14	3 p.m.	(4-in.)		
Fayette 8E	31 42	90 56	4.29					
			7.27					
			1.11					
Lorman	31 47 05	90 58 01	10.00	12-13		4-in. test tube type	Good	
Lorman 13SE	31 39 09	90 59 02	4.36	12	7 p.m.	Standard Miss. forest 2.5-in. gage	Good	
			7.20	12	2 p.m.			
			1.11	13	11 p.m.			
Jefferson Davis Co.								
Bassfield 5S	31 29	89 46	7.0	12-14		Glass tube	Fair	
Bassfield 1.5WSW			5.75			Glass fence post type	Good	
Broomtown Comm.	31 26 30	89 38 51	7.0+	11-14		6-in. wedge	Fair	
Carson	31 32	89 48	8.5	12-14		5-in. gage	Good	
Gwinville 2NW	31 44	89 52	19.4	12-14		Glass fence post type	Fair	
Magee 10SW	31 46	89 58	16.0	12-14		Glass fence post type	Fair	
Melba 3E	31 27	89 36	7.8	12-14		4-in. glass tube	Fair	
Oma 2S	31 43	90 03	12.0	12-14		Glass tube	Good	
Witen Comm.	31 40 37	89 54 20	15.0+	11-14		6-in. wedge		
Jones Co.								
Laurel A	31 41	89 09	1.00	12	3:30 p.m.	Plastic wedge	Good	Site at 1018 Jefferson St.
			3.50	13	8 a.m.			
			1.00	13	Noon			
			2.45	14	Evening			
Laurel B	31 40	89 08	1.1	12	2 p.m.	Plastic wedge	Good	Site at 1624 Airport Dr.
			5.9	14	Evening			
Laurel 4SW	31 39	89 10	5.5	12		Glass fence post type	Good	

Table 1--Continued

Location	Lat. N ° ' "	Long. W ° ' "	Rainfall (in.)	Date	Time (CDT)	Type of rain gage or container	Accuracy	Remarks
Jones Co. Continued								
Laurel 4SW (Con.)			1.5	13				
			1.5	13				
			1.2	14				
Moselle 2S	31 28	89 18	9.9	12-14		Unknown		Site at WDAM TV.
Sanderville 2NNW	31 48	89 03	7.25	12-14		Glass fence post type	Good	
Sanderville 2S	31 46	89 03	7.0	12-14		Glass fence post type	Fair	
Soso 2NW	31 45	89 17	12.5	12-14		Glass fence post type	Fair	
Tawanta	31 32	89 15	8.25	12-15			Poor	
Kemper Co.								
DeKalb 5S	32 47	88 45	5.01	12-14				
Lamar Co.								
Olah 3N	31 20	89 35	8.9	12-14		5-in. glass tube	Fair	
Olah 3W	31 17 23	89 38 17	5.80	11-14		6-in. wedge	Fair	
Purvis 4W	31 08	89 27	8.21	12-14				
Sumrall	31 25	89 32	7.07	12-14				
Sumrall 2.5S	31 23	89 37	7.0	12-14		Glass tube	Good	
Lauderdale Co.								
Meridian	32 24	89 43	7.50	12-14		Fence post	Unknown	Site at 2819 32d Ave.
Meridian 7NW	31 27	89 47	1.16	12				
			6.51	13				
			.25	14				
Lawrence Co.								
Arm	31 30	90 00	11.0	12-14		5-in. wedge	Good	
Grange	31 41	90 00	11.5	12-14		Glass tube	Fair	
Monticello 12N	31 43	90 03	14.5	12-14		4-in. glass tube	Fair	
Monticello 0.2S	31 33	90 06	0.1	12	7 a.m.	5-in. glass tube		
			3.7	12	2 p.m.			
			4.5	12	7 p.m.			
			6.5	13	2 p.m.			
			.5	14	10:30 a.m.			
New Heborn 4S	31 41	90 00	17.3			5-in. plastic	Good	
Oak Vale	31 26	89 58	6.25			Glass fence post type	Poor	
Wesson	31 42	90 12	10.25	12	6:30 p.m.	5-in. glass	Good	
			7.50	14	Noon			
Leake Co.								
Carthage 4SE	32 41	89 30	2.25	12			Good	Fire tower site.
			2.75	13				
			.50	14				
Lincoln Co.								
Brookhaven 10E	31 35	90 15	15.35	12-14		5-in. plastic	Fair	
Brookhaven 6WSW	31 32	90 32	1.27	12	2 p.m.		Good	Fire tower site.
			12.63	13	2 p.m.			
			2.47	14	2 p.m.			
Brookhaven 1NW	31 35	90 28	12.71			Standard 8-in. gage	Good	
Brookhaven 8NW	31 38 09	90 36 01	13.50	12-14		4-in. test tube type	Good	
Brookhaven Water Pt	31 35	90 27	11.73	12-14		Friez 12-in. recording	Good	

Table 1--Continued

Location	Lat. N ° ' "	Long. W ° ' "	Rainfall (in.)	Date	Time (CDT)	Type of rain gage or container	Accuracy	Remarks
Lincoln Co. Continued								
Monticello 7W	31 33	90 15	13.90			5-in. glass fence post type	Good	
Ruth	31 23 00	90 18 54	11.20	11-14		Universal type gage		
Madison Co.								
Canton 9E	32 37	89 53	8.00			5-gal. bucket	Fair	
Marion Co.								
Bunker Hill 4E	31 24	89 44	8.30	12-14		5-in. tube type	Fair	
Bunker Hill 2SW	31 22	89 50	5.60			Glass fence post type	Fair	
Columbia 4NE	31 17	89 46	9.90	12-14		5-in. tube	Fair	
Columbia 8NE	31 21	89 45	9.50	12-14		Glass tube	Good	
Columbia 5SW	31 12	89 55	5.70	12-14				Fire tower site.
Darbun 9NE	31 22	89 56	7.0	12-14		Glass fence post type	Fair	
Goss	31 21	89 53	7.00	12-14		Glass fence post type	Good	
Improve 3W	31 20	89 45	9.2	12-14		5-in. glass tube	Fair	
Morgantown	31 18	89 55	7.0	12-14		Glass fence post type	Fair	
Morgantown nr.	31 18 40	89 55 40	8.0	11-14		6-in. wedge	Poor	Amount estimated.
Neshoba Co.								
Philadelphia	32 46	89 07	6.74	12-14				
Philadelphia 9NE	32 48	88 59	3.81	12	2 p.m.		Good	Fire tower site.
			3.42	13	2 p.m.			
			.07	14	2 p.m.			
Newton Co.								
Newton nr.	32 22	89 07	8.12	12-14			Good	Fire tower site.
Noxubee Co.								
Macon 4SW	33 07	88 38	5.33	12-14			Good	Fire tower site.
Pearl River								
Poplarville 5SE	30 45	89 30	8.45	12-15			Good	Fire tower site.
Perry								
Richton 3SW	31 23	89 09	5.10	13	2 p.m.		Good	Fire tower site.
			3.95	14	2 p.m.			
			.40	15	2 p.m.			
Pike Co.								
McComb 3N	31 18 05	90 27 08	3.0	12	2 p.m.		Good	Fire tower site.
			8.0	13	2 p.m.			
			1.7	14	6 p.m.			
Summit	31 16 17	90 28 33	6.0+	11-14		6-in. wedge	Fair	
Rankin Co.								
Florence	32 10	90 08	6.5	12-14				
Florence nr.			6.1	12-14		6-in. wedge	Fair	Site approximately 10 mi NW of Florence.
Florence 6SSW	32 05	90 12	8.0	12-14		5-gal. bucket	Fair	
Goshen Spring	32 28	89 55	5.62					
Scott Co.								
Forest 11WSW	32 25	89 41	6.65				Good	Firetower site.
Pulaski 3SE	32 15	89 36	7.20	12-15				

Table 1--Continued

Location	Lat. N ° ' "	Long. W ° ' "	Rainfall† (in.)	Date	Time (CDT)	Type of rain gage or container	Accuracy	Remarks
Simpson Co.								
Georgetown 4SE	31 50	90 08	11.25	12-14		5-in. glass	Fair	
Harrisville 1S	31 57 34	90 03 47	9.75	11-14		6-in. wedge	Good	
Harrisville 7W	32 00	90 12	9.0	12-14		4-in. glass fence post	Fair	
Magee	31 52	89 44	12.9	12		Science Assoc. rain gage		
			2.7	13				
			1.4	14				
Mendenhall 8ENE	21 59	89 44	12.5					
Mendenhall 8SE	31 53	89 46	5.89	12		2.75 in. x 11 in.	Good	
			8.93	13				
			5.94	14				
Mendenhall 10S	31 49	89 53	16.00	12-14		5-in. wedge	Good	
Pinole 5S	31 49	89 58	15.40	12-14		5-in. glass	Good	
Shivers	31 47 44	89 59 16	15.0+	11-14		5-in. wedge	Fair	
Smith Co.								
Lorena 3S	32 10	89 33	11.9	12-13		5-in. glass		
Mize 2NE	31 54	89 32	12.4	12-14		5-gal. bucket		
Raleigh 2WNW	32 03	89 33	12.05			Standard 8-in. gage	Good	
Summerland	31 48	89 22	13.0			Glass fence post type	Good	
Stone Co.								
Wiggins 4NE	30 54	89 05	4.71					
Wiggins 7SE	30 51	89 02	4.45	13-15				Fire tower site.
Walthall Co.								
Enon	31 14 47	90 11 53	5.0+	11-14		5-in. wedge	Poor	
Salem	31 12 00	90 06 45	7.0	11-14		6-in. wedge	Fair	
Tylertown 7ESE	31 04	90 02	.32	12			Good	Fire tower site.
			3.90	13				
	.70	14						
Tylertown	31 07	90 09	5.29					
Tylertown 11NNE	31 15	90 08	5.7			Glass fence post type	Good	
Warren Co.								
Bovina 10N	32 27	90 44	4.21	12-13			Good	Fire tower site.
Redwood	32 29	90 48	4.00			Tube type		
Vicksburg 10SE	32 15 12	90 45 40	6.00	12-14		Tube type	Good	
Vicksburg 10S	32 12 20	90 52 45	8.25	12-14	Tube type	Tube type	Good	
Wayne Co.								
Ovett 5ESE	31 32	88 54	9.55	12-14		8-in. standard	Good	Fire tower site.
Wayne fire tower	31 38	88 40	6.45	13			Good	Fire tower site.
			1.55	14				
			.08	15				
Waynesboro	31 41	88 38	5.98					
Waynesboro 2W	31 41	88 40	6.82					
Waynesboro 4SW	31 37	88 43	8.08					
Wilkinson Co.								
Centerville	31 06	91 03 42	3.12	12-14				
Woodville 6E	31 06	91 14	.65	12				
			5.95	13				
			1.28	14				

Table 1--Continued

Location	Lat. N ° ' "	Long. W ° ' "	Rainfall (in.)	Date	Time (CDT)	Type of rain gage or container	Accuracy	Remarks
Winston Co.								
Louisville 3N	33 10	89 01	3.10	12				
			2.00	13				
			1.4	14				

Table 2.--Supplementary rainfall data at forest lookout stations in Louisiana for April 11-16, 1974

Location		Lat. N	Long. W	Amount (in.) and date in April 1974 (at 1 p.m. CDT)						
County	Lookout	° ' "	° ' "	11	12	13	14	15	16	Total
Allen	Oberlin	30 36 17	92 46 24	0	1.08	0.61	0.32	0	0.06	2.07
Beauregard	Glendale	30 50 29	93 19 03	0	0.68	1.08	.27	0	0	2.03
Bienville	Sailes	32 23 00	93 07 27	0	2.00	.15	0	0	0	2.15
Bossier	Bodcan	32 41 39	93 30 24	.10	1.55	0	0	0	0	1.65
Caddo	Greenwood	32 24 06	93 59 06	.25	2.31	.08	0	0	0	2.64
Calcasien	DeQuincy	30 22 36	93 28 07	0	3.50	.40	1.30	.10	.75	6.15
Caldwell	Mt. Pleasant	32 09 51	92 11 01	0	8.00	.10	0	0	0	8.10
Catahonla	Aimwell	31 37 42	91 58 48	0	3.08	.85	0	0	0	3.93
Claiborne	Antioch	32 52 45	93 00 31	0	1.91	.20	0	0	0	2.11
DeSoto	Grand Cane	32 07 42	93 48 11	.05	1.07	0	0	0	0	1.12
E. Feliciana	Clinton	30 52 38	90 56 33	0	4.00	1.89	1.06	.04	.04	7.03
Evangeline	Beaver	30 46 47	90 33 22	0	.75	3.05	1.20	0	0	5.01
Franklin	Winnsboro	32 09 28	91 42 02	0	3.46	.42	0	0	0	3.88
Grant	Antonia	31 36 05	92 26 13	0	1.66	2.00	0	0	0	3.66
"	Catahonla	31 30	92 30	0	2.42	.15	.05	0	0	2.62
Jackson	Jonesboro	32 13 11	92 41 43	0	3.27	0	0	0	0	3.27
LaSalle	Belah	31 38 27	92 10 55	0	2.00	1.65	.05	0	0	3.70
Lincoln	Hilly Lookout	32 38 48	92 41 29	0	1.50	0	0	0	0	1.50
Livingston	Springville	30 26 27	90 39 14	0	.07	3.17	.40	.88	.15	4.67
Morehouse	Stevenson	32 53 40	91 57 52	0	2.60	0	0	0	0	2.60
Natchitoches	Gorum	31 25 00	92 53 30	0	1.10	.16	.02	0	0	1.28
"	Kisatchie	31 29 40	93 12 00	0	7.15	.35	.05	0	0	7.55
"	Natchitoches	31 44 54	93 06 44	0	8.63	.05	0	0	0	8.68
Oreachita	Calhoun	32 29 24	92 23 42	0	2.60	0	0	0	0	2.60
Rapids	Gardner	31 18 00	93 06 00	0	2.11	1.26	.31	0	0	3.68
"	Woodworth	31 08 09	92 28 21	0	5.62	3.72	2.48	0	0	11.82
Red River	Martin	32 04 40	93 13 00		0	2.67	0	0	0	0

NOTE: All observations were from 8-in. standard rain gage; accuracy for all observations was "good."

Table 2.--Continued

Location: County	Location: Lookout	Lat. N ° ' "	Long. W ° ' "	Amount (in.) and date in April 1974 (at 1 p.m. CDT): 11	12	13	14	15	16	Total
Sabin	Fisher	31 32 05	93 25 16	0	8.45	0	0.05	0	0	8.50
St. Helena	Pine Grove	30 42 39	60 45 09	0	0.14	1.46	.72	.37	.10	2.79
St. Tammany	Abita Springs	30 26 15	90 02 47	0	.01	2.42	1.59	1.16	.07	5.25
Tangipahoa	Hammond	30 32 08	90 28 56	0	0	3.34	.24	1.32	.08	3.98
Union	Spearsville	32 53 54	92 34 03	0	1.75	0	0	0	0	1.75
Vernon	Leesville	31 08 12	93 18 36	0	.62	T	.68	T	0	1.30
"	Vernon	31 00 00	93 06 00	0	1.35	.60	.62	0	0	2.57
Washington	Sheridan	30 51 29	89 58 25	0	.27	2.97	1.35	.62	0	5.21
Webster	Dutchtown	32 41 55	93 14 18	0	1.82	1.03	0	0	0	2.85
Winn	Gum Springs	31 54 00	92 46 20	0	11.88	0	0	0	0	11.88
"	Winona	32 03 15	92 39 40	0	9.20	.23	0	0	0	9.43

Table 3.--Comparison of some past storm rainfalls[1] within a 100-mi radius of Monticello, Miss., with the observed rainfall in the storm of April 11-15, 1974, at Raleigh, Miss.[2]

Date of storm	Precipitation center	Maximum average depth (in.) for 10-mi² area for duration (hr) 6	12	24	48
Apr. 15-18, 1900	Eutaw, Ala. Natchez, Miss.	7.6	9.9	12.6	13.9
Dec. 6-10, 1916	Brookhaven, Miss. Norcross, Ga.	5.8	7.8	8.6	11.6
Apr. 5-9, 1958	Lock No. 2, Ala.	7.9	8.9	9.0	13.4
		Observed depth at Raleigh, Miss.			
Apr. 11-15, 1974	Nr. Mendenhall, Miss.	5.7	8.4	9.2	12.0

[1]Storms selected are cyclone-scale storms that covered at least part of three states out of four (Alabama, Georgia, Mississippi, or Louisiana).

[2]Raleigh, Miss., is located 20 mi (32 km) east-northeast of the precipitation center and has a recording gage station.

Table 4.--Stages associated with the flood of April 1974

River and station	Flood stage (ft)	Dates in April 1974 above flood stage	Crest Stage (ft)	Crest Date
Pearl River				
Edinburg, Miss.	20	13-20	26.80	4/15/74
Carthage, Miss.	17	12-22	24.5	4/16/74
Ofahoma, Miss.	14	13-19	16.1	4/14/74
Jackson, Miss.	18	13-Cont.	34.5	4/19/74
Monticello, Miss.	19	13-Cont.	32.6	4/14/74
Columbia, Miss.	17		27.25	4/15/74
Bogalusa, La.	15	All April	22.14	4/18/74
Pearl River, La.	12	All April*	18.2	4/21/74
Chickasawhay River				
Enterprise, Miss.	20	13-17	34.2	4/15/74
Shubuta, Miss.	30	14-21	41.6	4/16/74
Waynesboro, Miss.	35	17-23	41.9	4/18/74
Leaf River				
Hattiesburg, Miss.	22	14-19	34.03	4/15/74
Beaumont, Miss.	20	14-23	32.2	4/17/74
Pascagoula River				
Merrill, Miss.	22	15-25	28.0	4/29/74
Big Black River				
West, Miss.	12	13-21	19.4	4/15/74
Bovina, Miss.	28	12-30	35.1	4/18/74
Tallahala Creek				
Laurel, Miss.	13	13-21	21.85	4/14/74
Tombigbee River				
Tibbee, Miss.	22	14-17	25.95	4/14/74
Gainesville, Ala.	36	14-21	43.7	4/16/74

NOTE: Data compiled from reports by National Weather Service Forecast Offices in Jackson, Miss., and New Orleans, La.

*All April except part of the 12th.

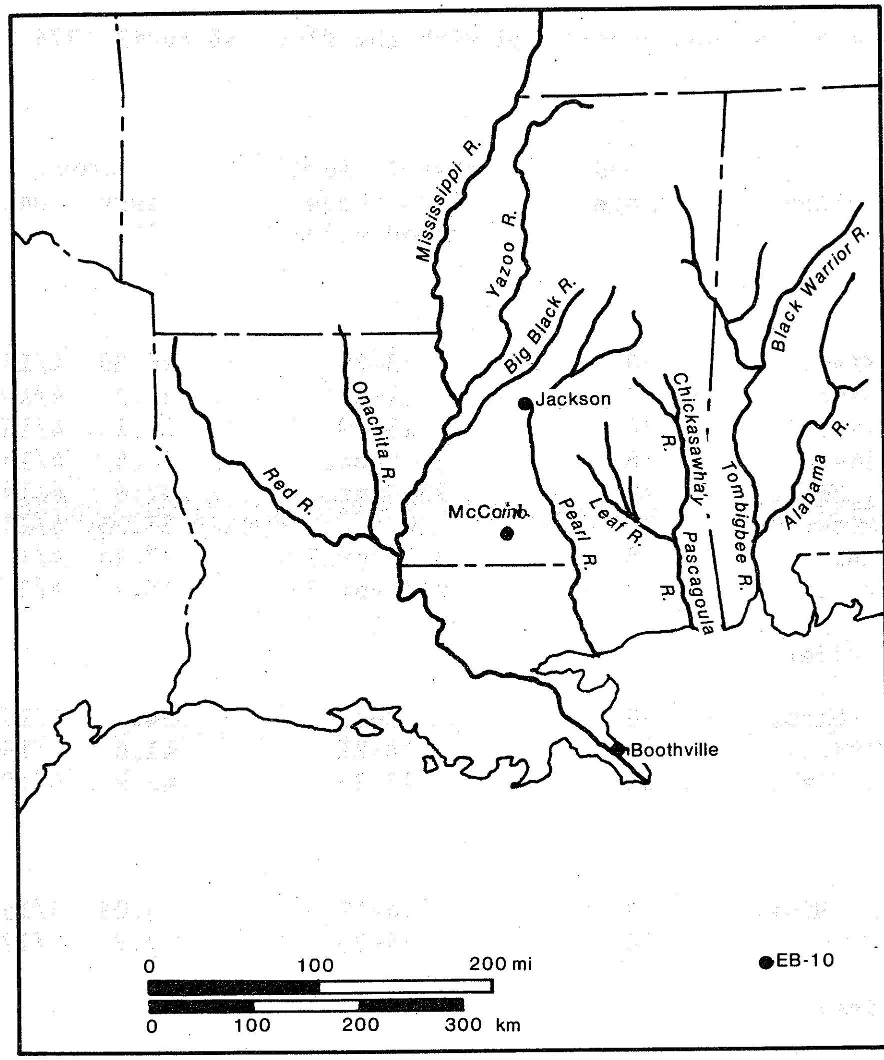


Figure 1a--Map of Louisiana, Mississippi, and western Alabama showing major rivers and the location of NOAA environmental data buoy EB-10.

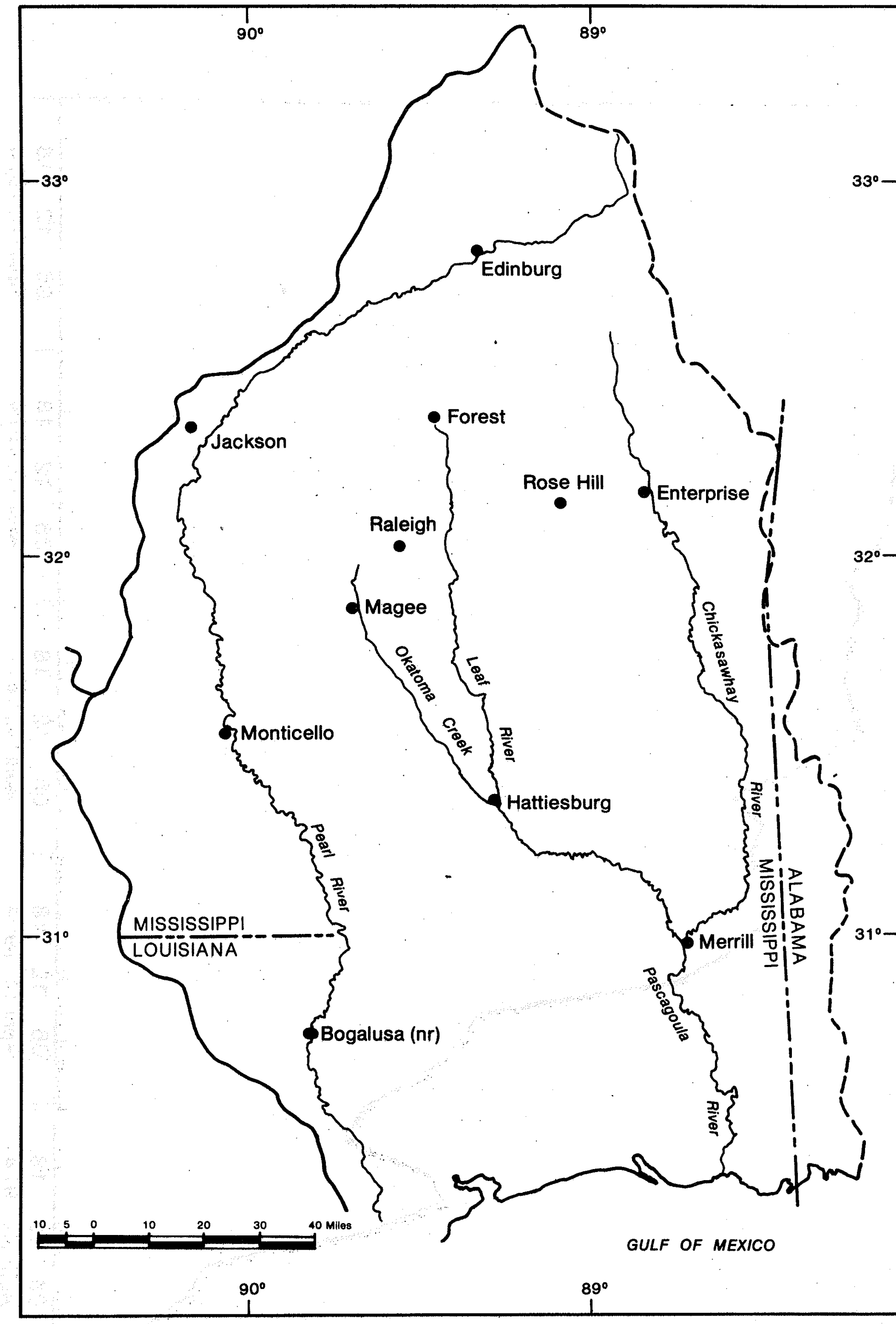


Figure 1b--Map of Pascagoula and Pearl River Basins.

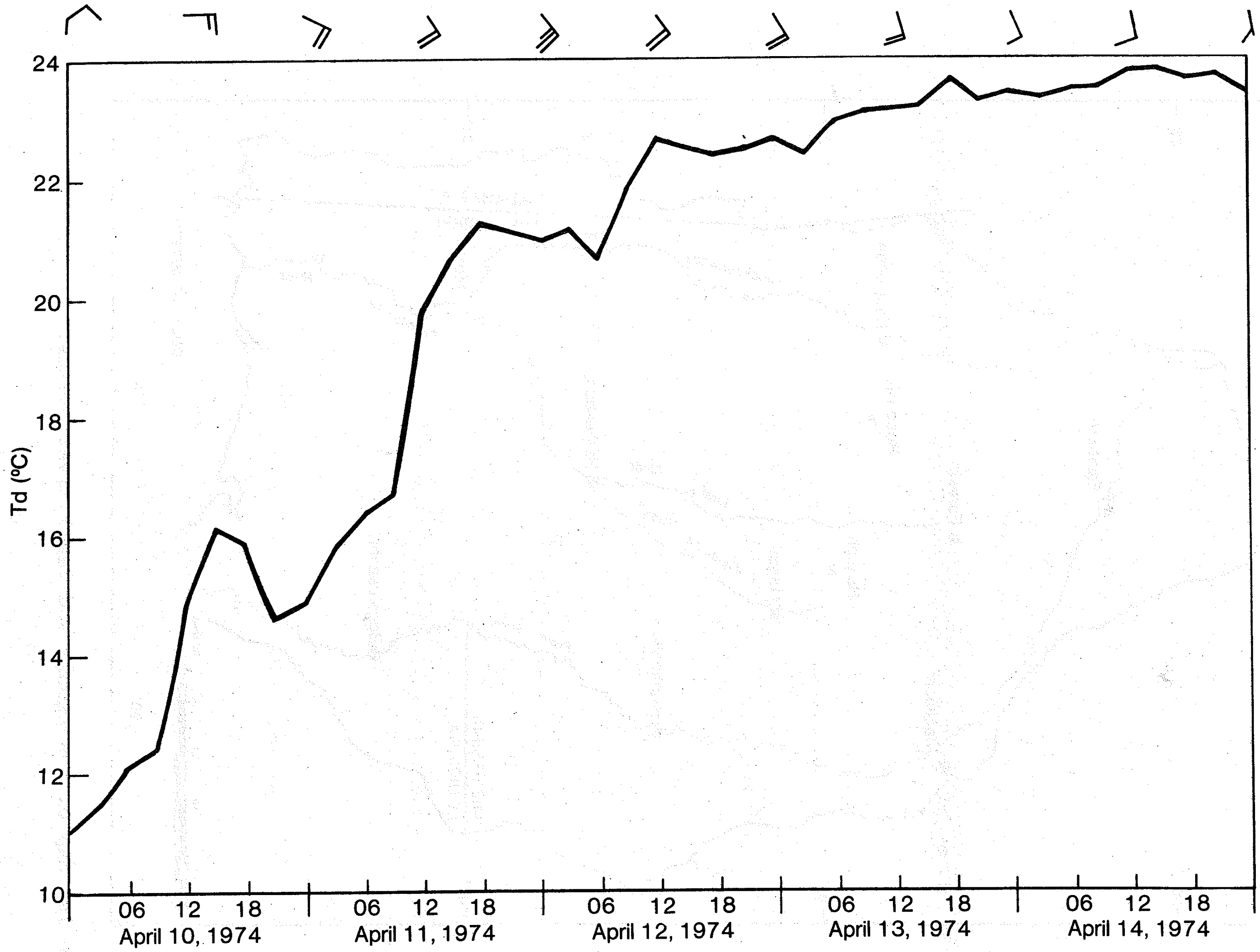
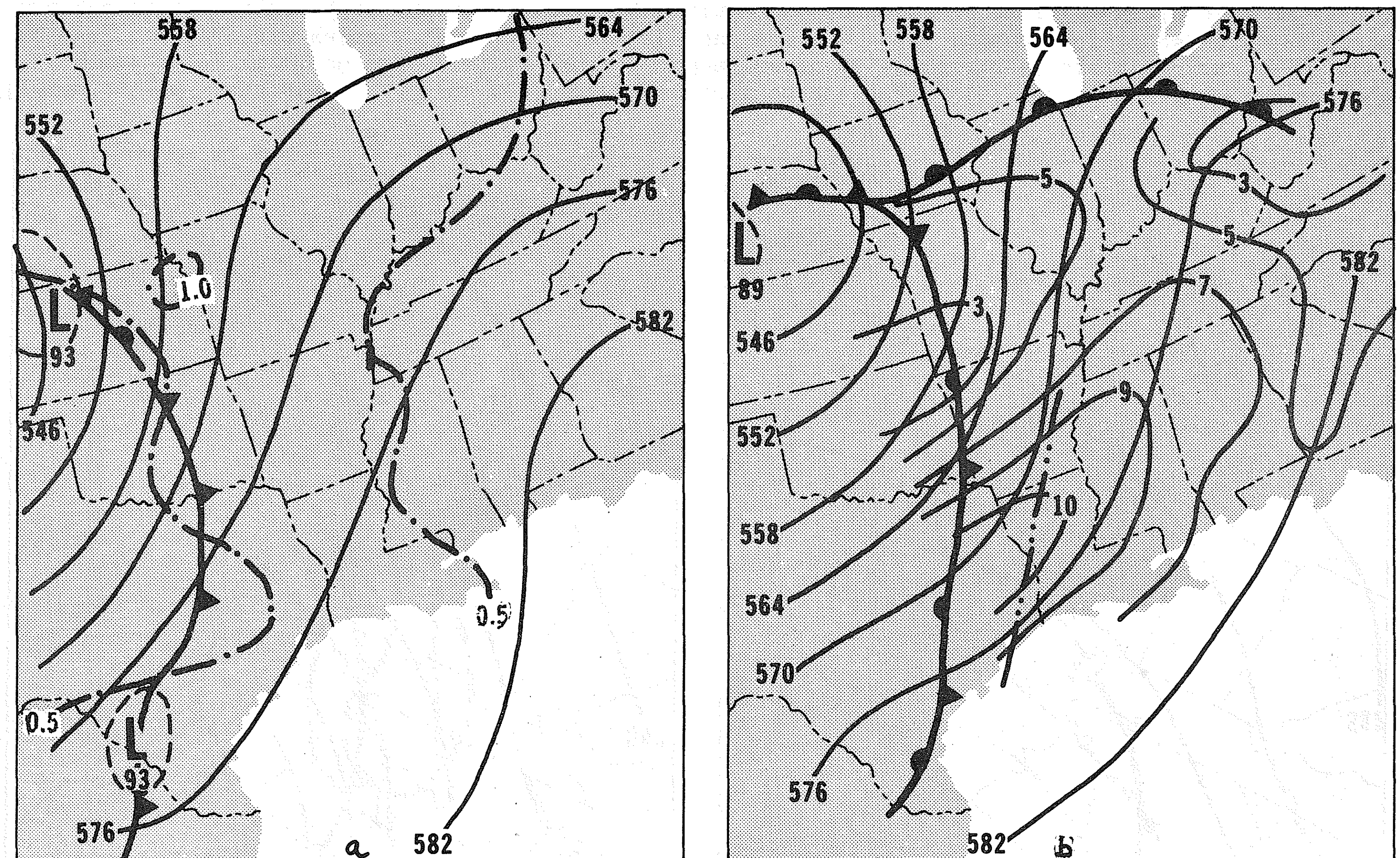
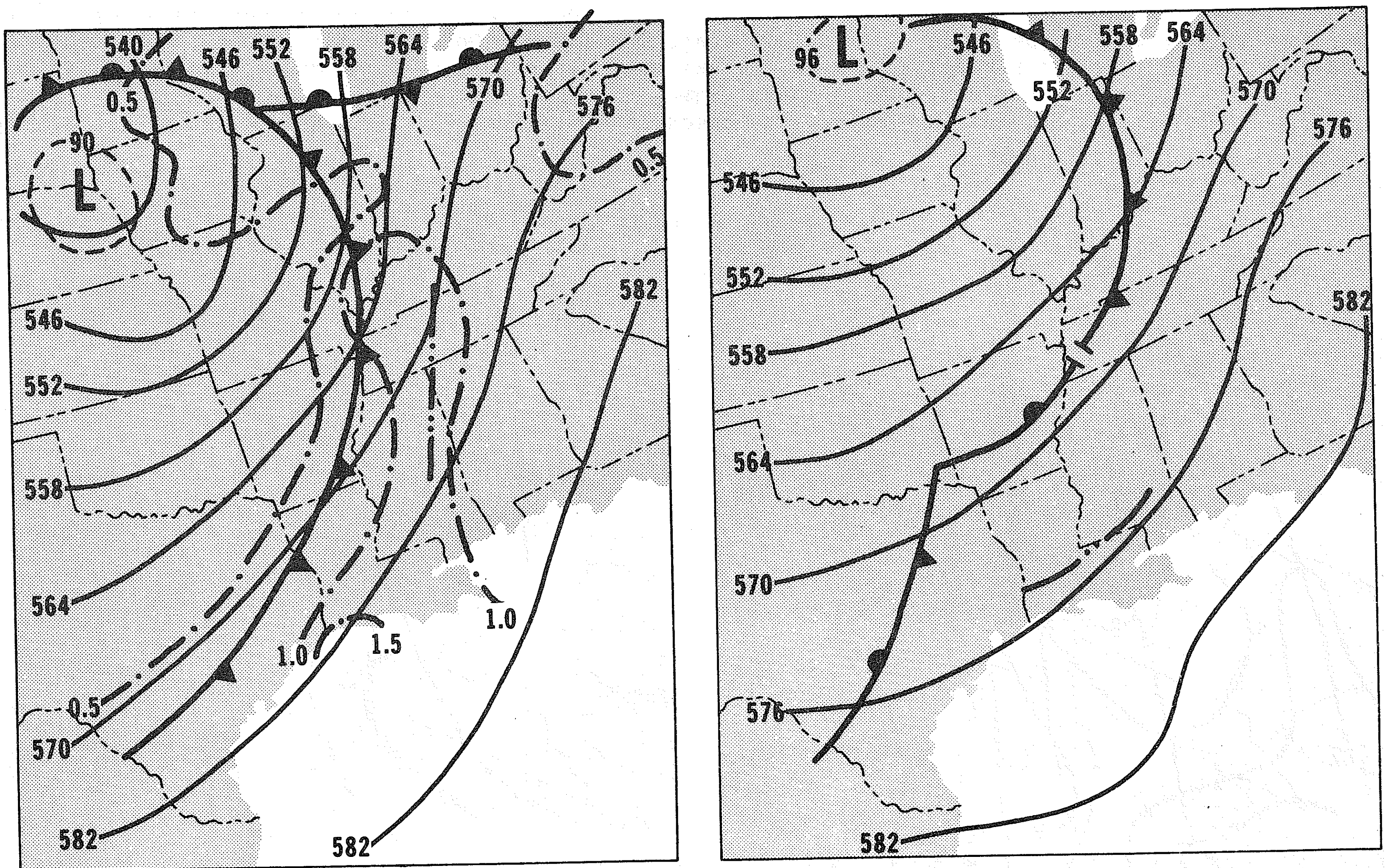


Figure 2.--Dew point (°C) and wind velocity at NOAA buoy EB-10 (27°28.5'N, 88°01.5'W) at 10-m level in the period April 10-14, 1974, all times in CST.

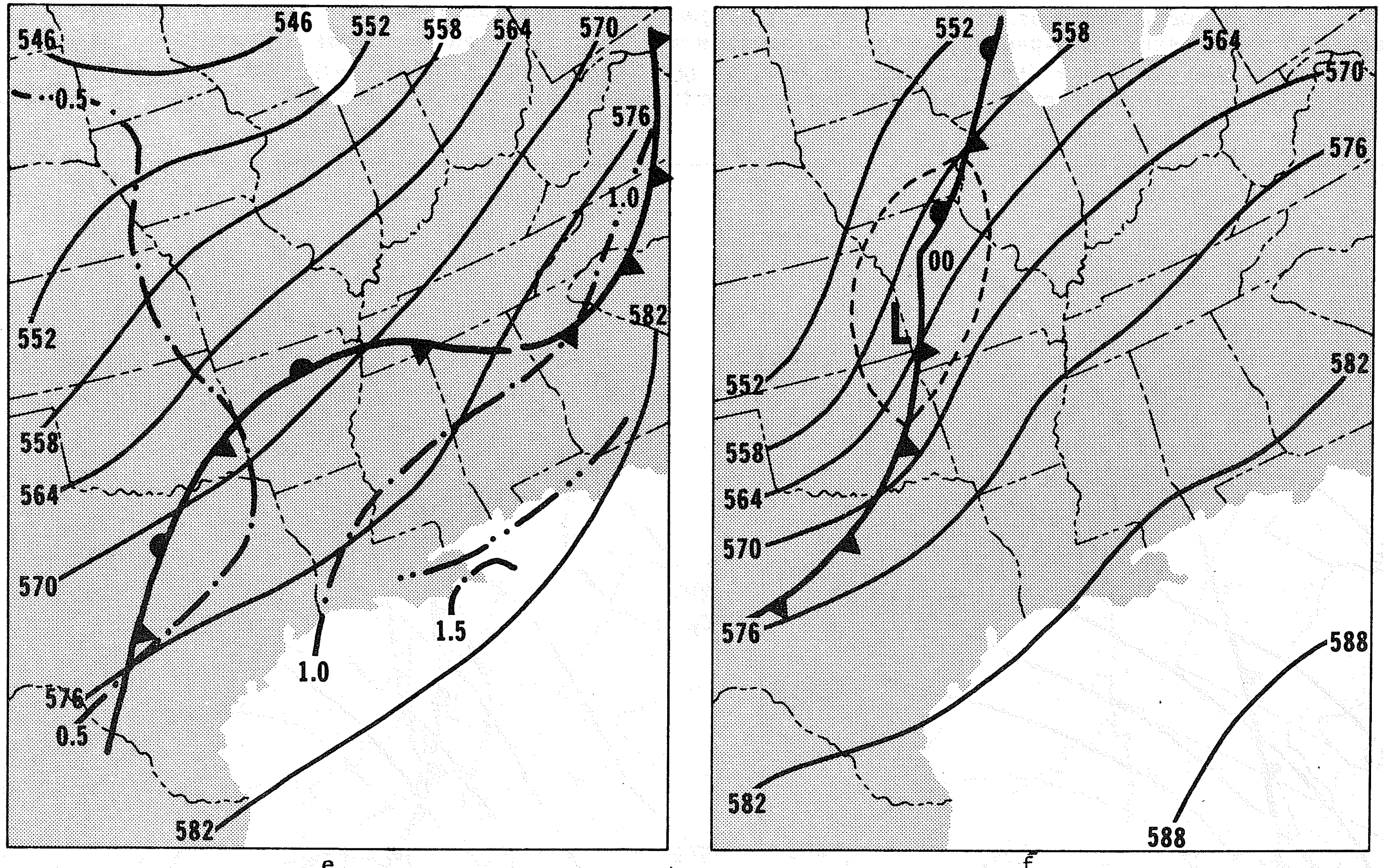


Figures 3a - b--Maps showing 500-mb contours superposed on surface Lows and fronts for: a. 0600 CST April 11, 1974; b. 1800 CST April 11, 1974. 500-mb heights (solid lines) are given in decameters, precipitable water in the layer from the surface to 500-mb (dash-dot lines) are in inches; and the closed isobar (dashed line) about the surface Low in mb. In 3b isolines with numerical labels up to 10 denote 850-mb mixing ratios in g/kg.

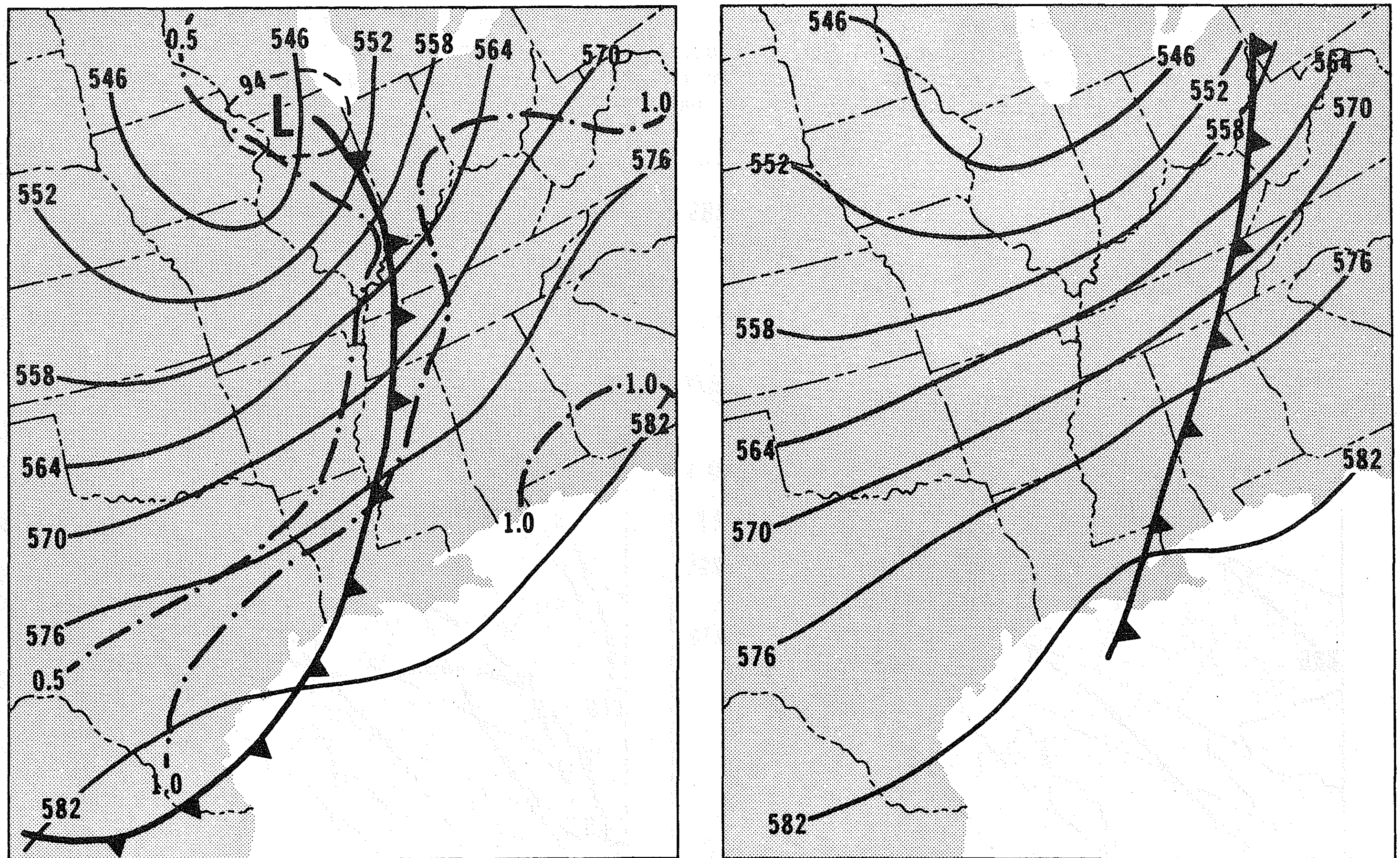


c d

Figures 3c - d--Maps showing 500-mb contours superposed on surface Low(s) and fronts for: (c) 0600 CST April 12, 1974; (d) 1800 CST April 12, 1974. 500-mb heights (solid lines) are given in decameters, precipitable water in the layer from the surface to 500-mb (dashed-dot lines) are in inches; and the closed isobar (dashed line) about the surface Low in mb with the first digit of 9 omitted. Dashed-dot-dot-dashed line denotes squall line.

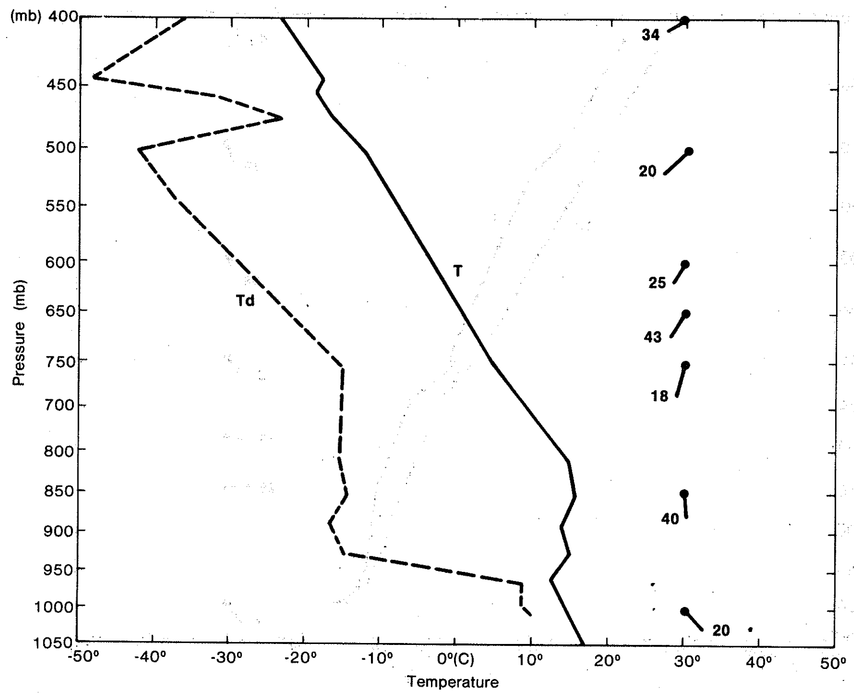


Figures 3e - f--Maps showing 500-mb contours superposed on surface Low(s) and fronts for: (e) 0600 CST April 13, 1974; (f) 1800 CST April 13, 1974. 500-mb heights (solid lines) are given in decameters, precipitable water in the layer from the surface to 500-mb (dashed-dot lines) are in inches; and the closed isobar (dahsed line) about the surface Low in mb with first two digits 10 omitted. Dashed-dot-dot-dashed line denotes squall line.

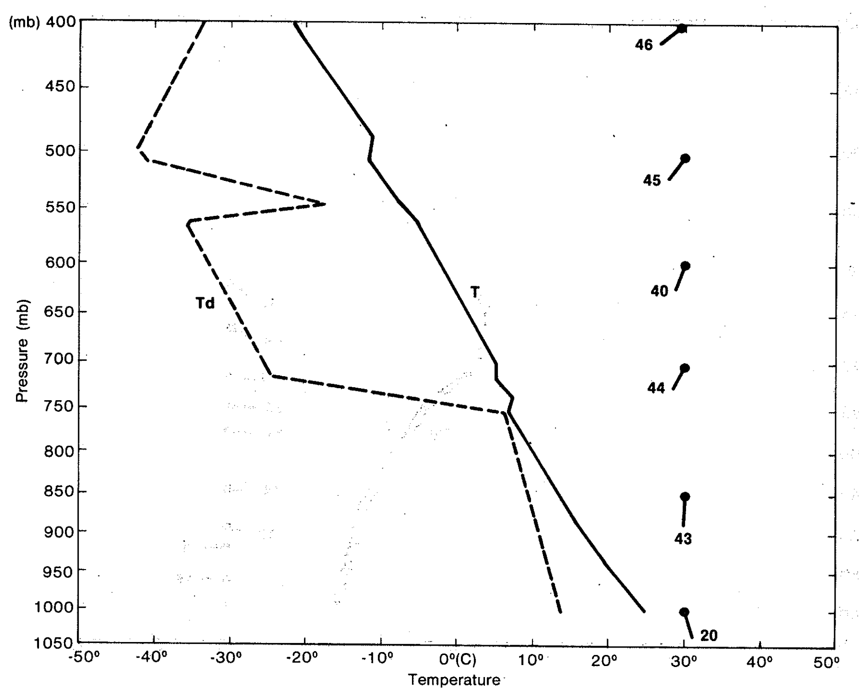


g h

Figures 3g - h--Maps showing 500 mb contours superposed on surface Low(s) and fronts for: (g) 0600 CST April 14, 1974; (h) 1800 CST April 14, 1974. 500 mb heights (solid lines) are given in decameters, precipitable water in the layer from the surface to 500 mb (dashed-dot lines) are in inches; and the closed isobar (dashed line) about the surface Low in mb with first digit 9 omitted.

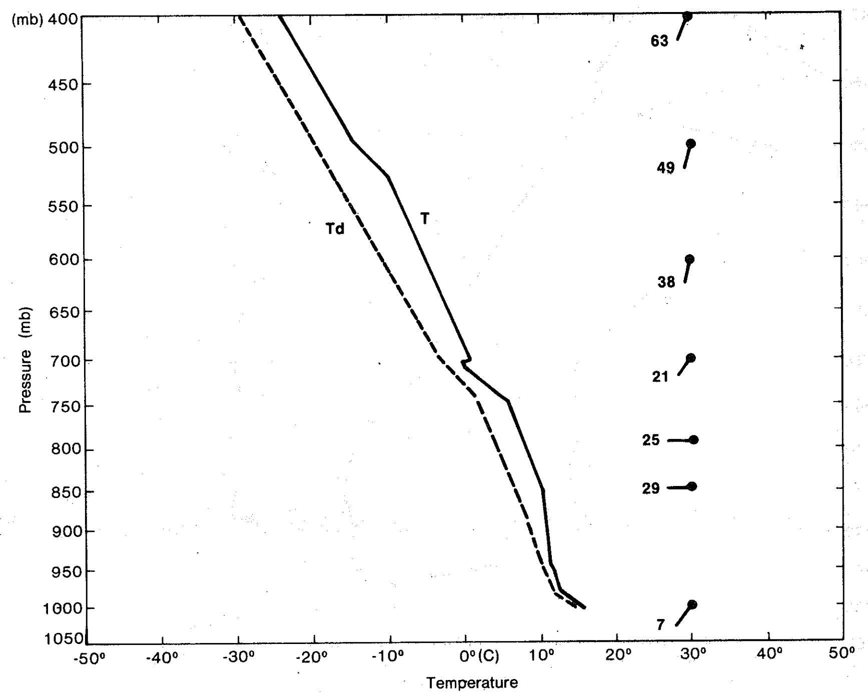


a

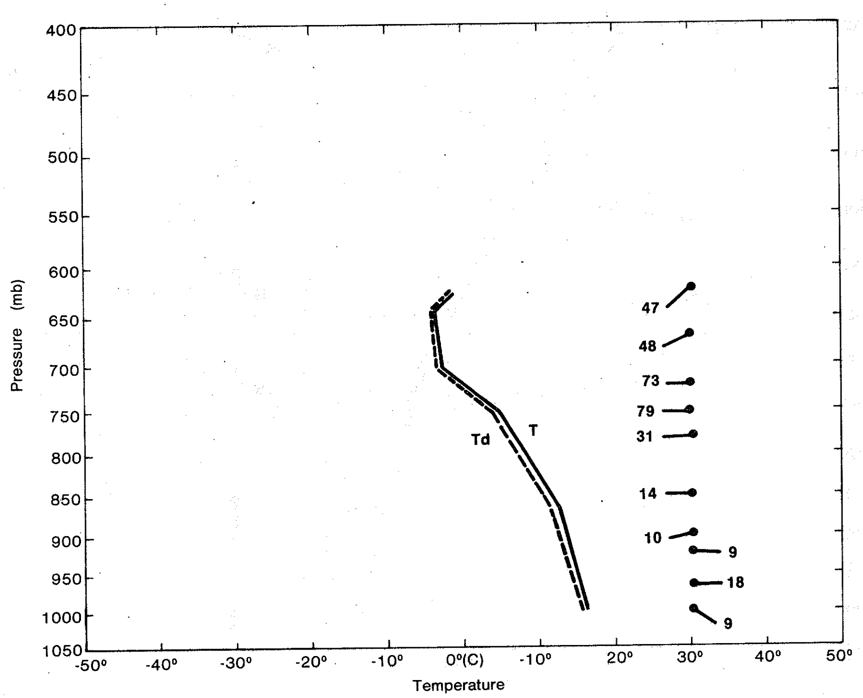


b

Figures 4a - b--Upper air temperature (T) and dew point (T_d) soundings at Jackson, Miss., at: (a) 0600 CST April 11, 1974; (b) 1800 CST April 11, 1974. Wind speeds for selected levels are given in knots.



c



d

Figures 4c - d--Upper air temperature (T) and dew point (T_d) soundings at Jackson, Miss., at: (c) 0600 CST April 12, 1974; (d) 1800 CST April 12, 1974. Wind speeds for selected levels are given in knots.

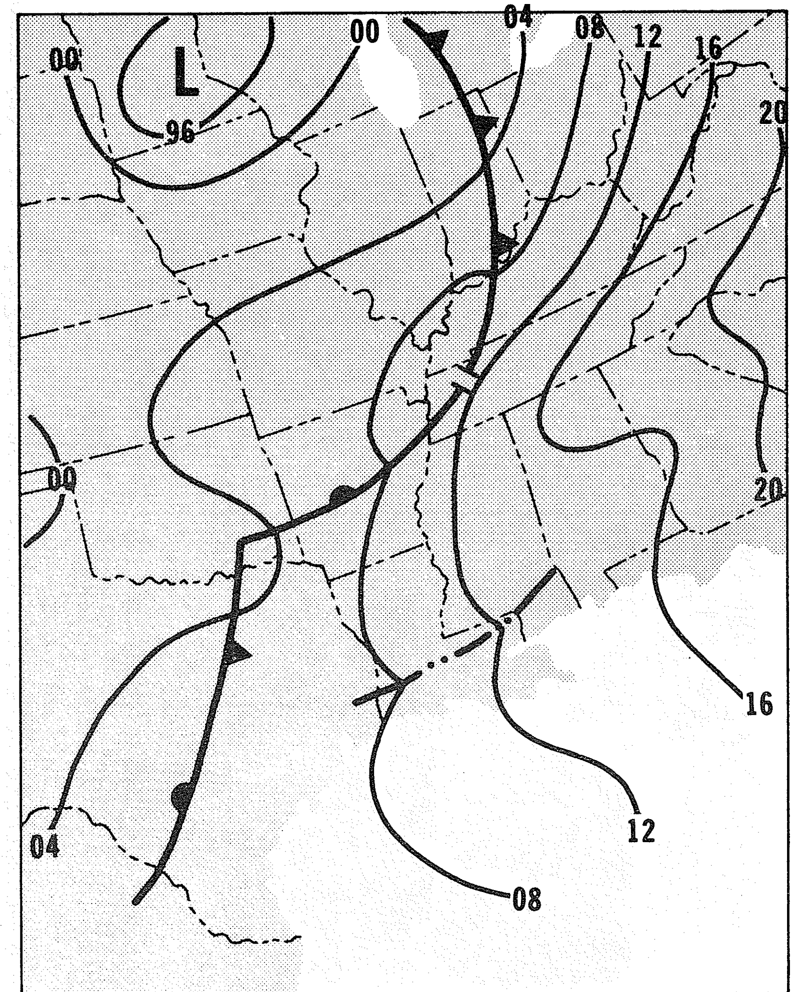


Figure 5a--Surface chart at 1800 CST April 12, 1974. Notice squall line over southern Louisiana and Mississippi.

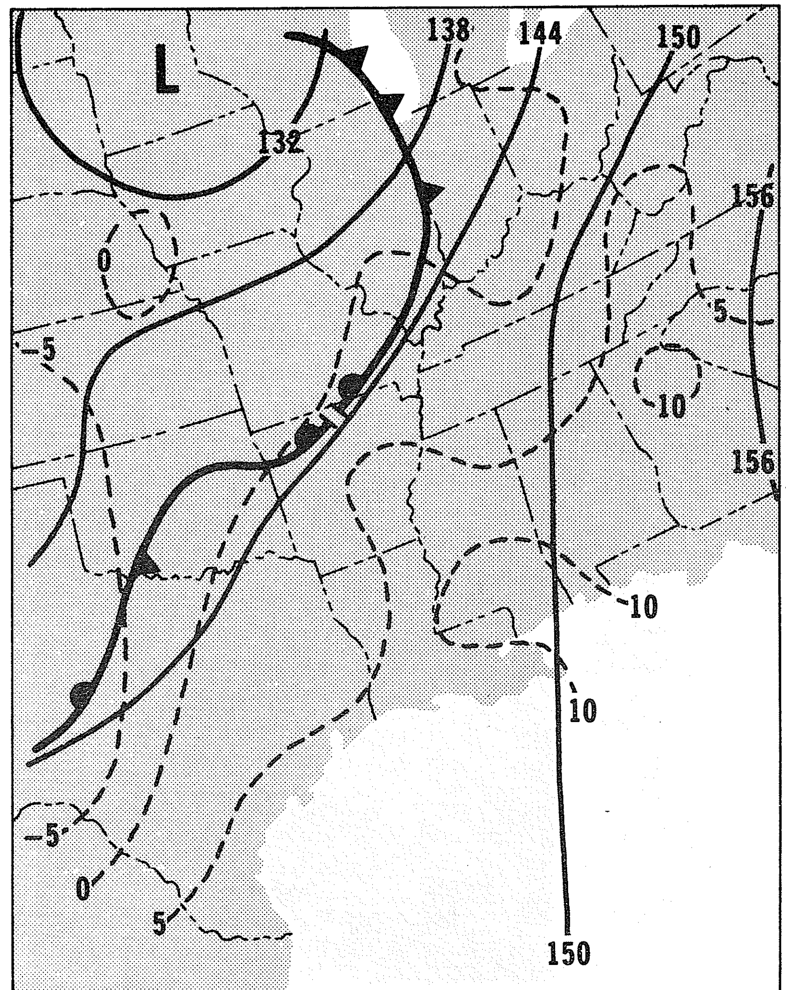
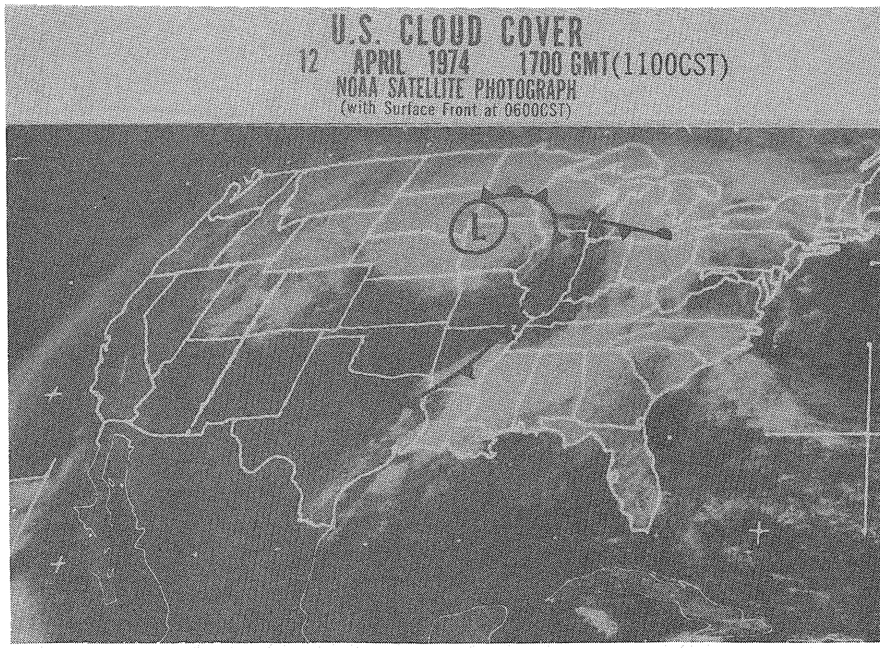
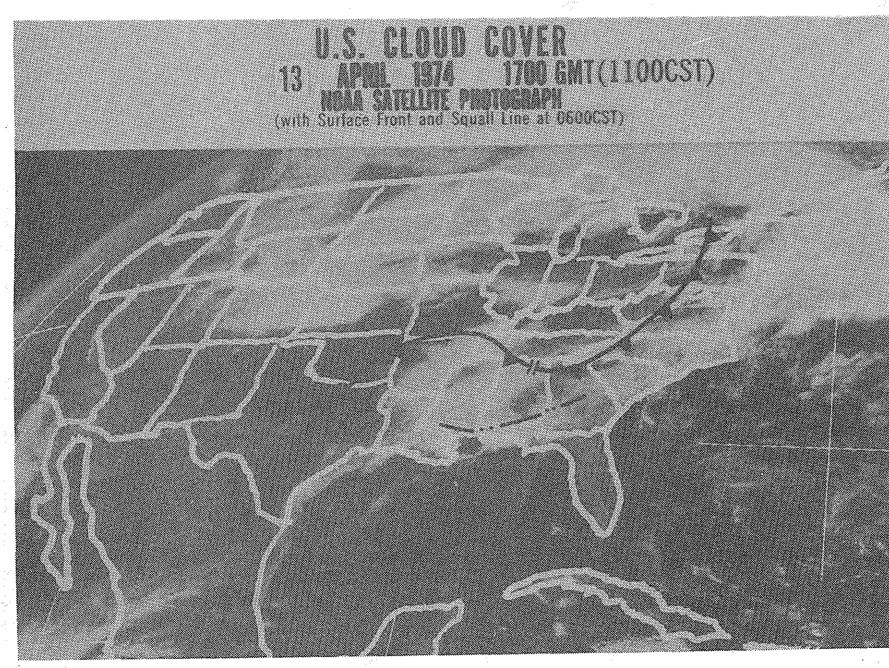


Figure 5b--850-mb chart at 1800 CST April 12, 1974. Contours (solid lines) are in decameters, dashed-lines show dew-point temperatures in °C.



a



b

Figures 6a - b--Composite satellite cloud cover photographs for: (a) 1100 CST April 12, 1974; (b) 1100 CST April 13, 1974.

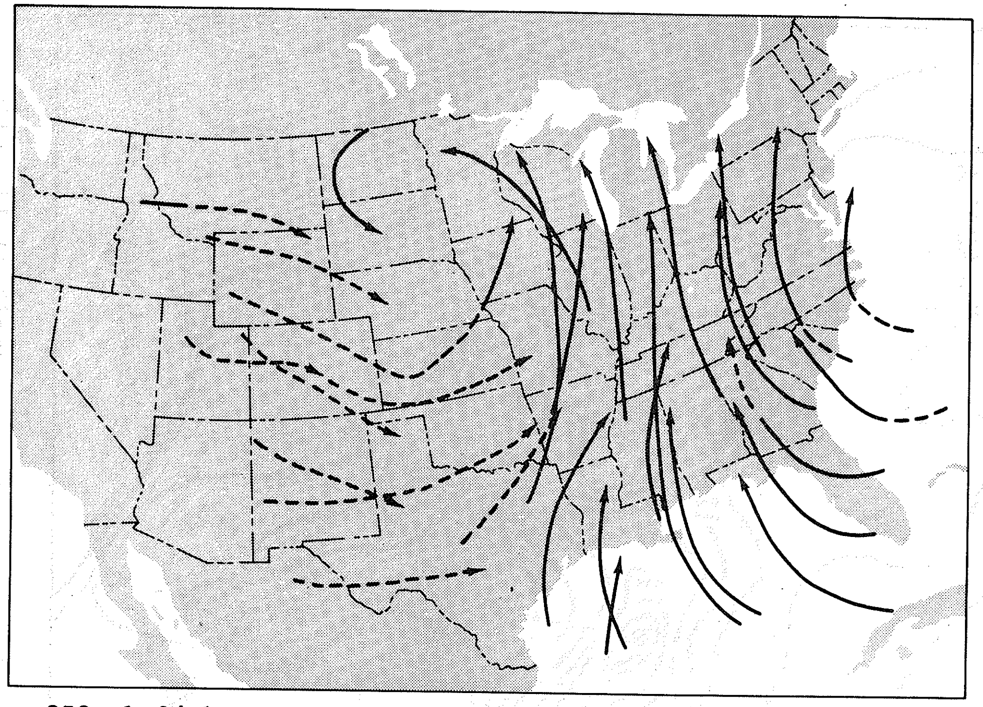


Figure 7a--850-mb 24-hr air parcel trajectory for period ending at 1800 CST April 12, 1974. Dashed arrows indicate descending motion and solid arrows indicate rising motion.

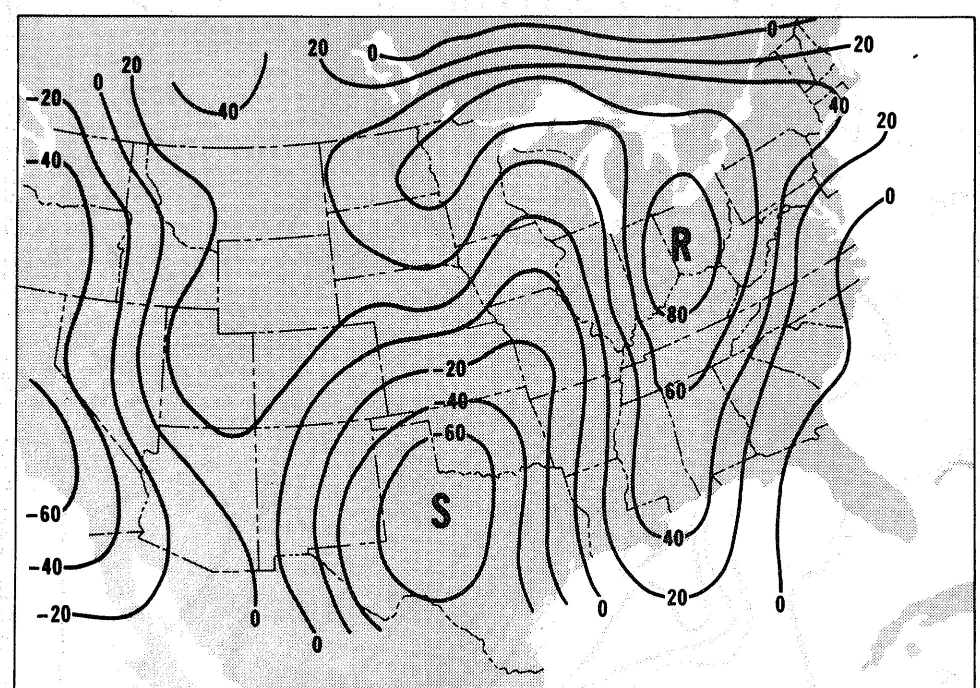


Figure 7b--700-mb 12-hr air parcel vertical displacement in mb per 12 hr valid at 1800 CST April 12, 1974.

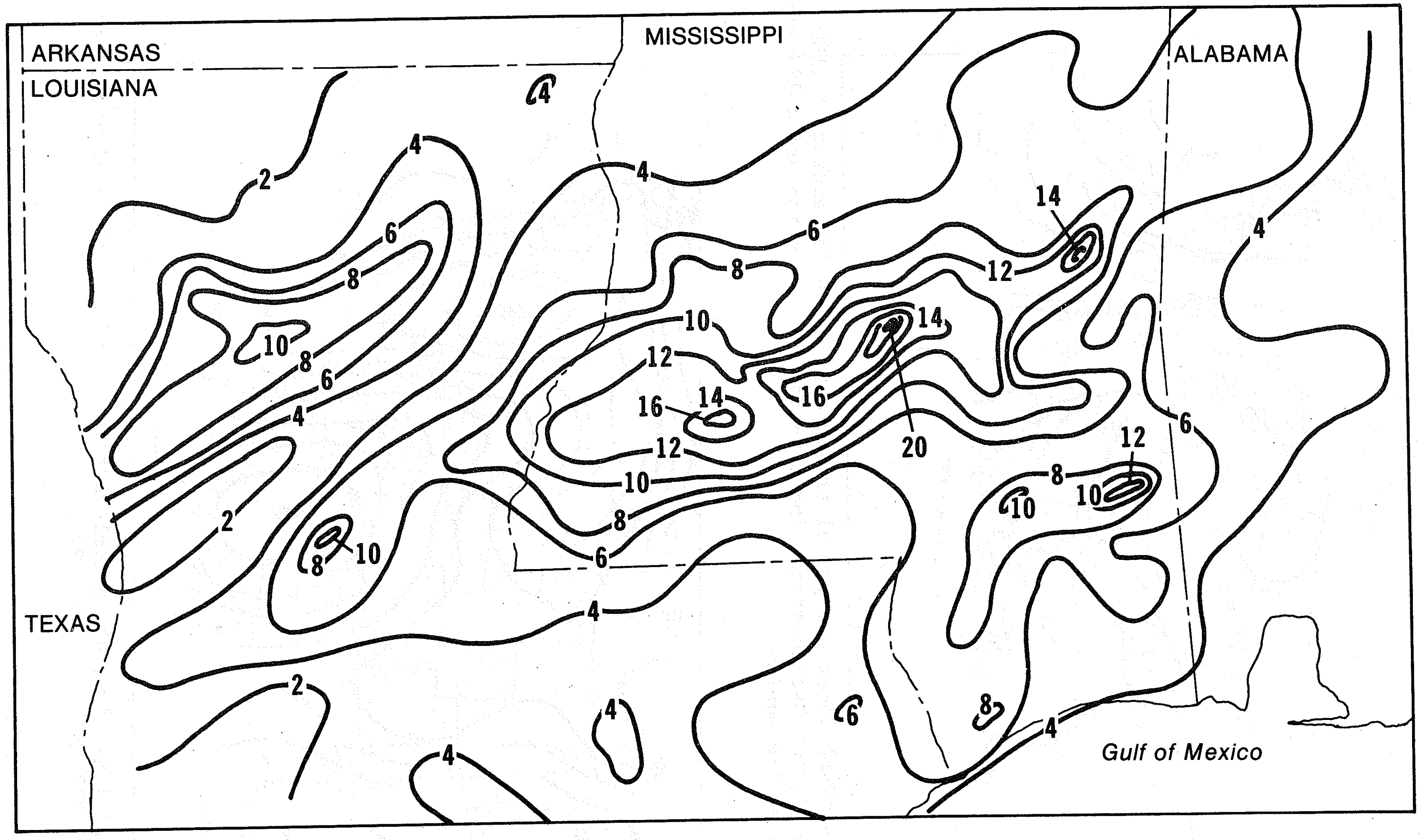
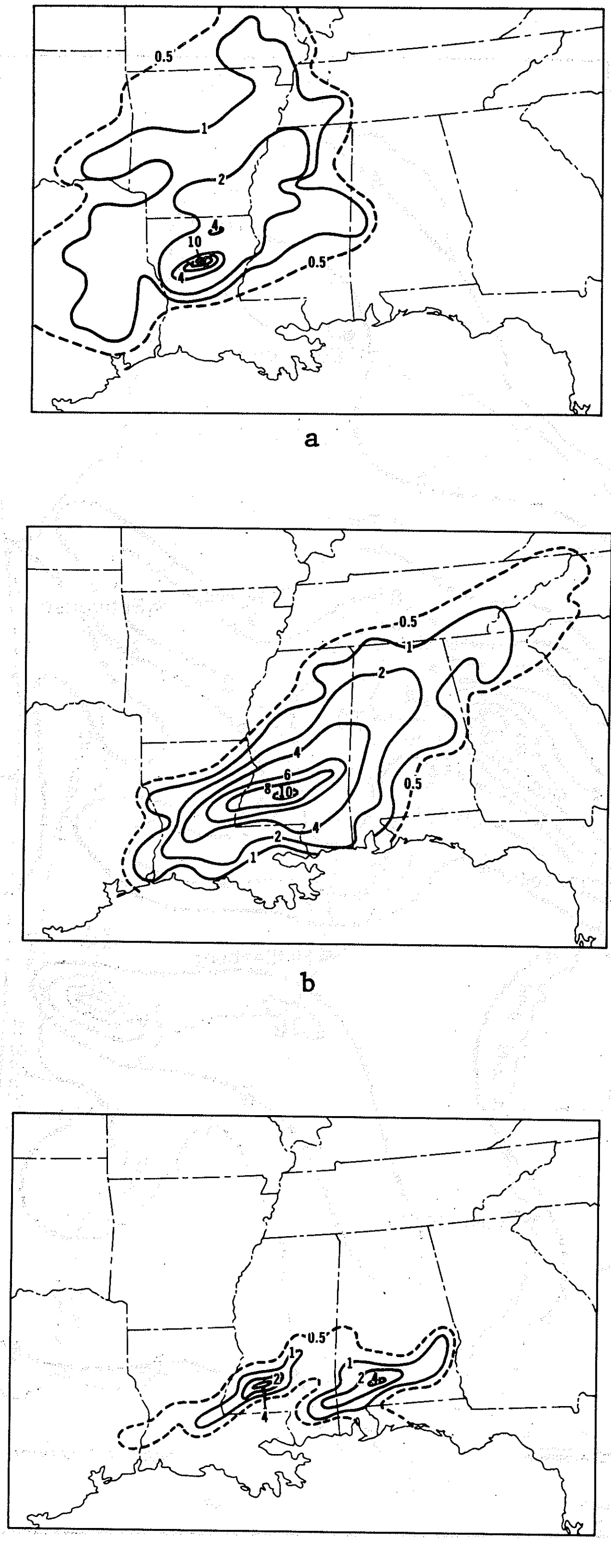


Figure 8.--Total rainfall (in.) over Louisiana, Mississippi, and western Alabama, April 11-15, 1974.



a

b

c

Figure 9--Rainfall (in.) over Southern United States for 24-hr period ending 0600 CST for: (a) April 12, 1974; (b) April 13, 1974; (c) April 14, 1974.

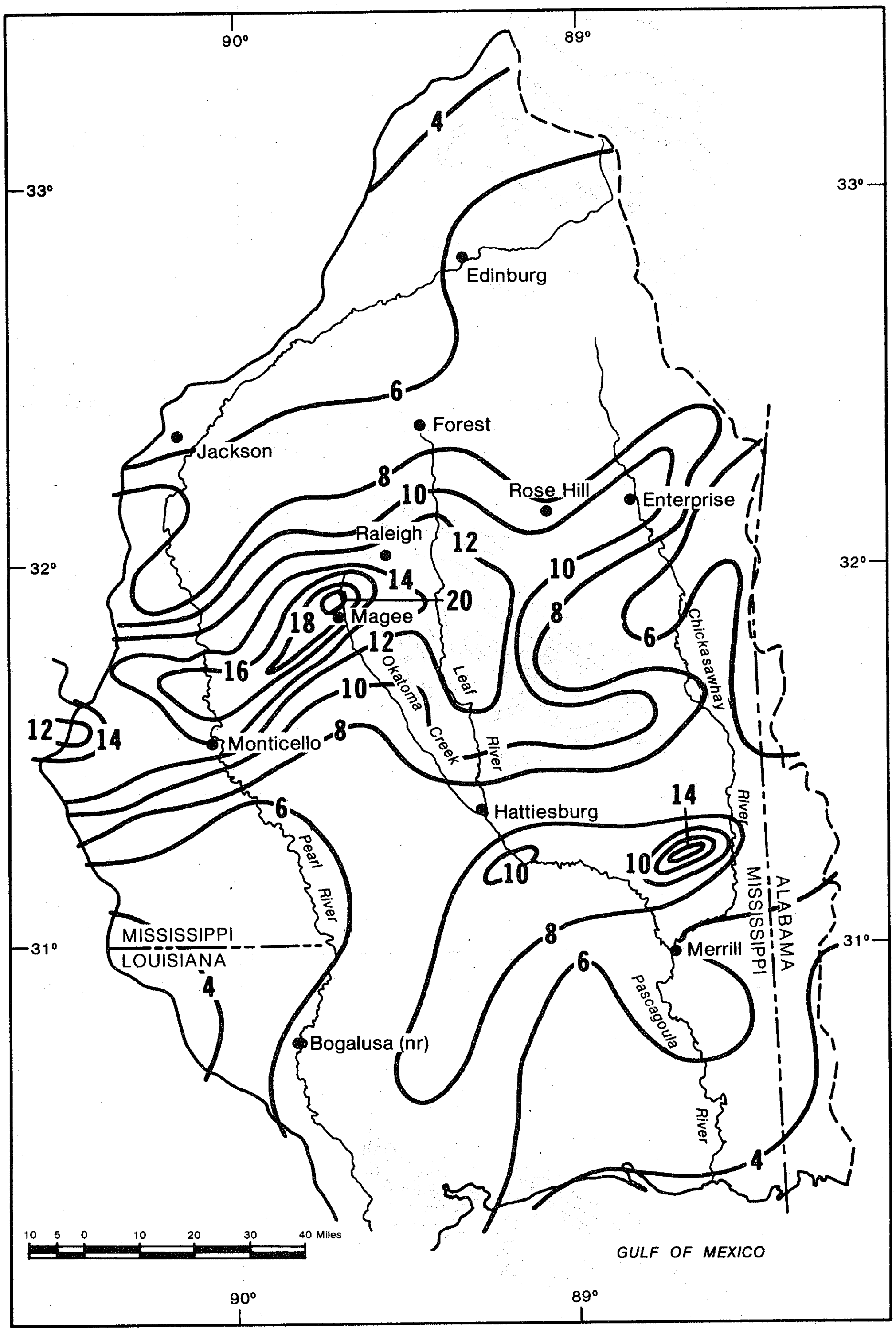


Figure 10--Total storm rainfall (in.) over the Pascagoula and Pearl River Basins, April 11-15, 1974.

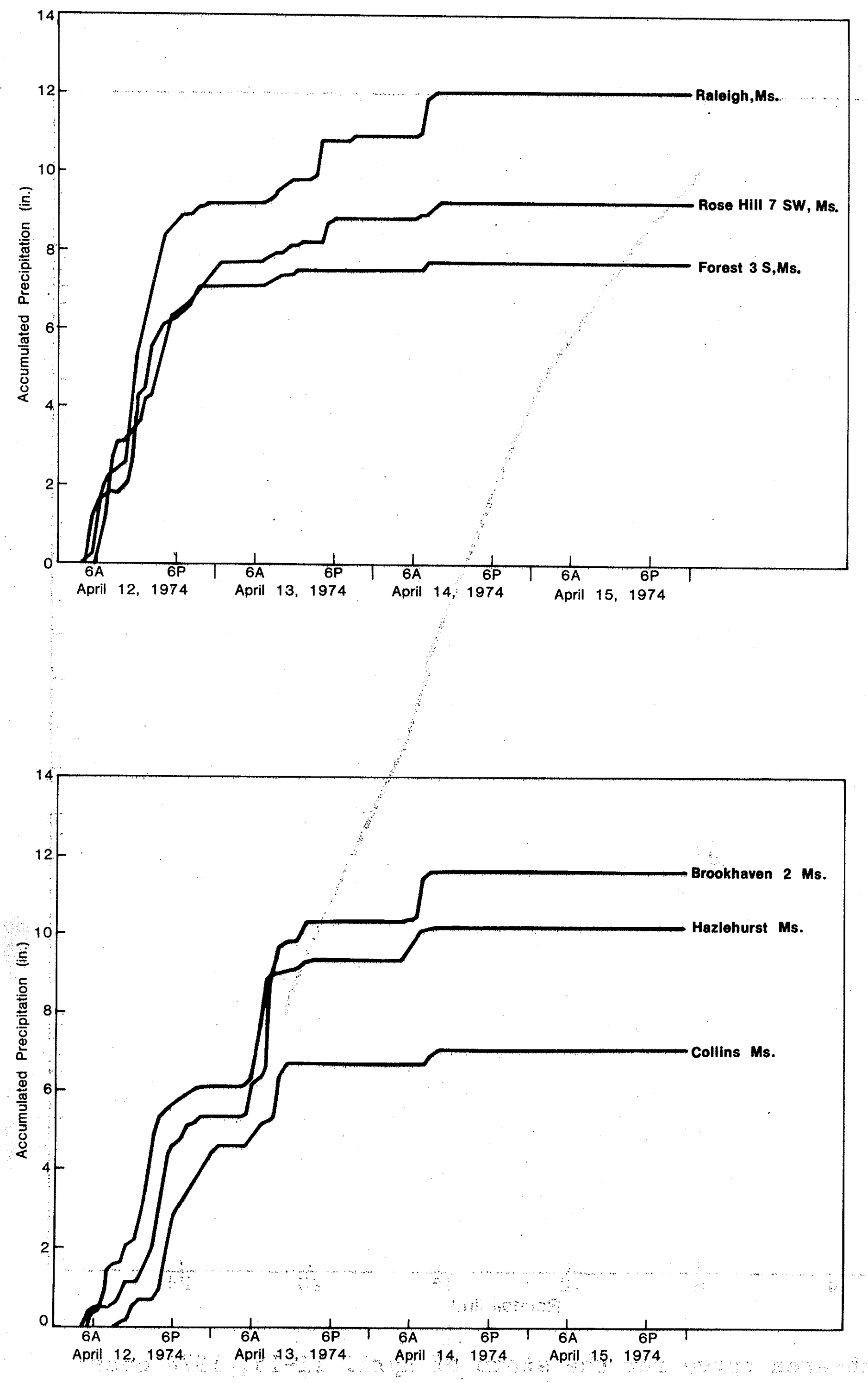


Figure 11--Mass rainfall curves for selected stations in the storm of April 11-15, 1974.

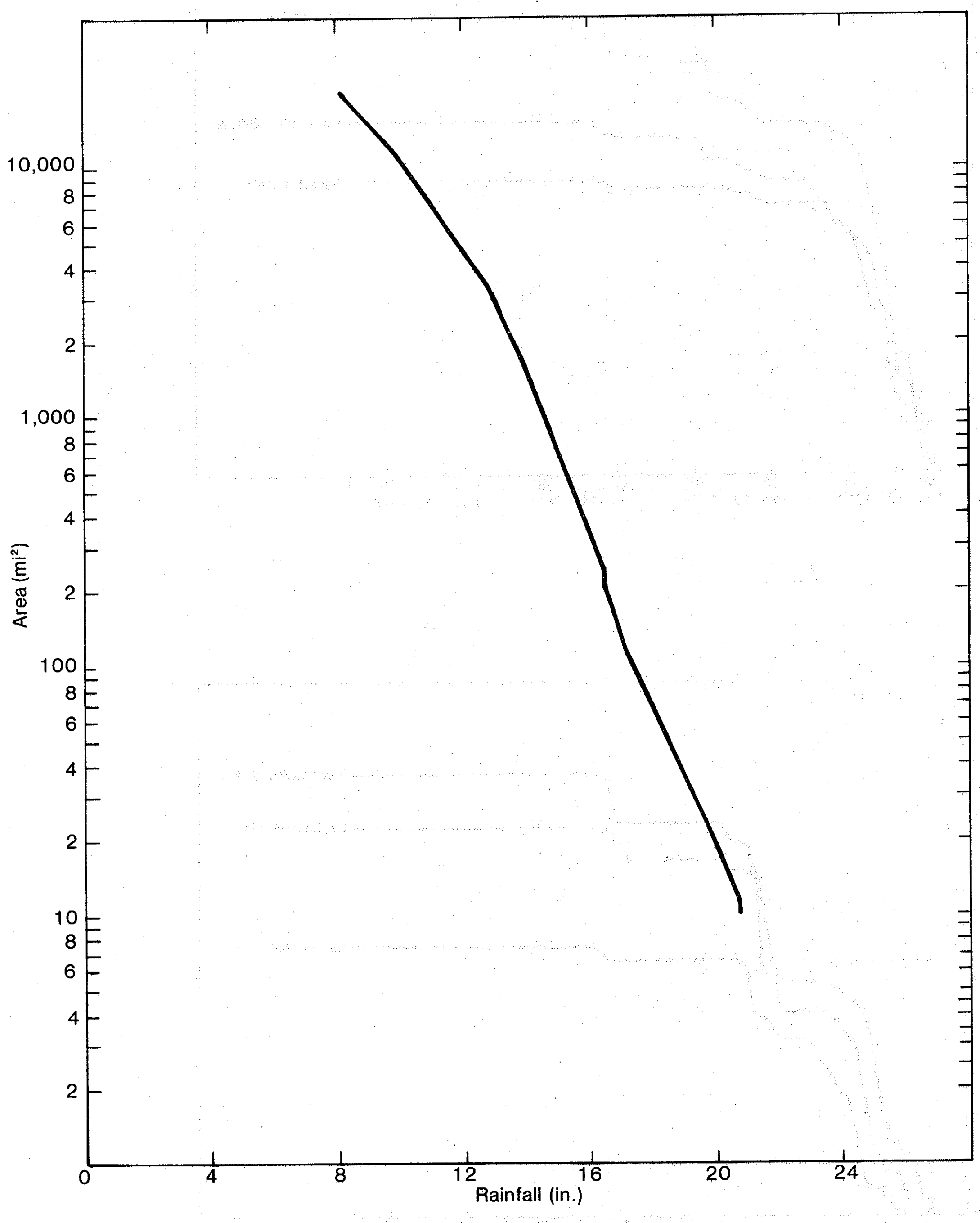


Figure 12--Depth-area curve for the storm of April 11-15, 1974 over Mississippi, Louisiana, and western Alabama.

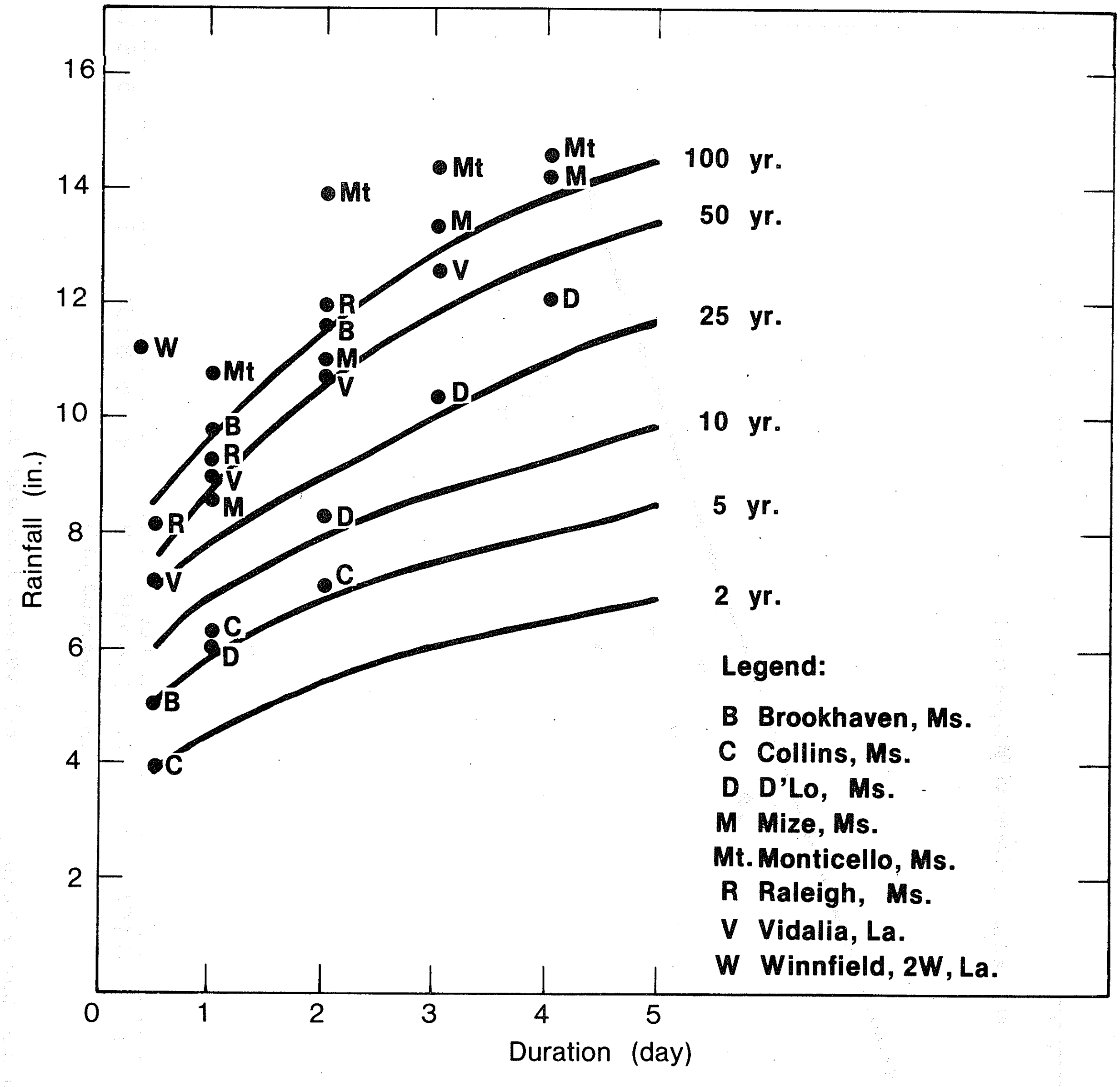


Figure 13--Comparison of some observed rainfalls in the storm of April 11-15, 1974, with frequency curves valid at 32°N 90°W.

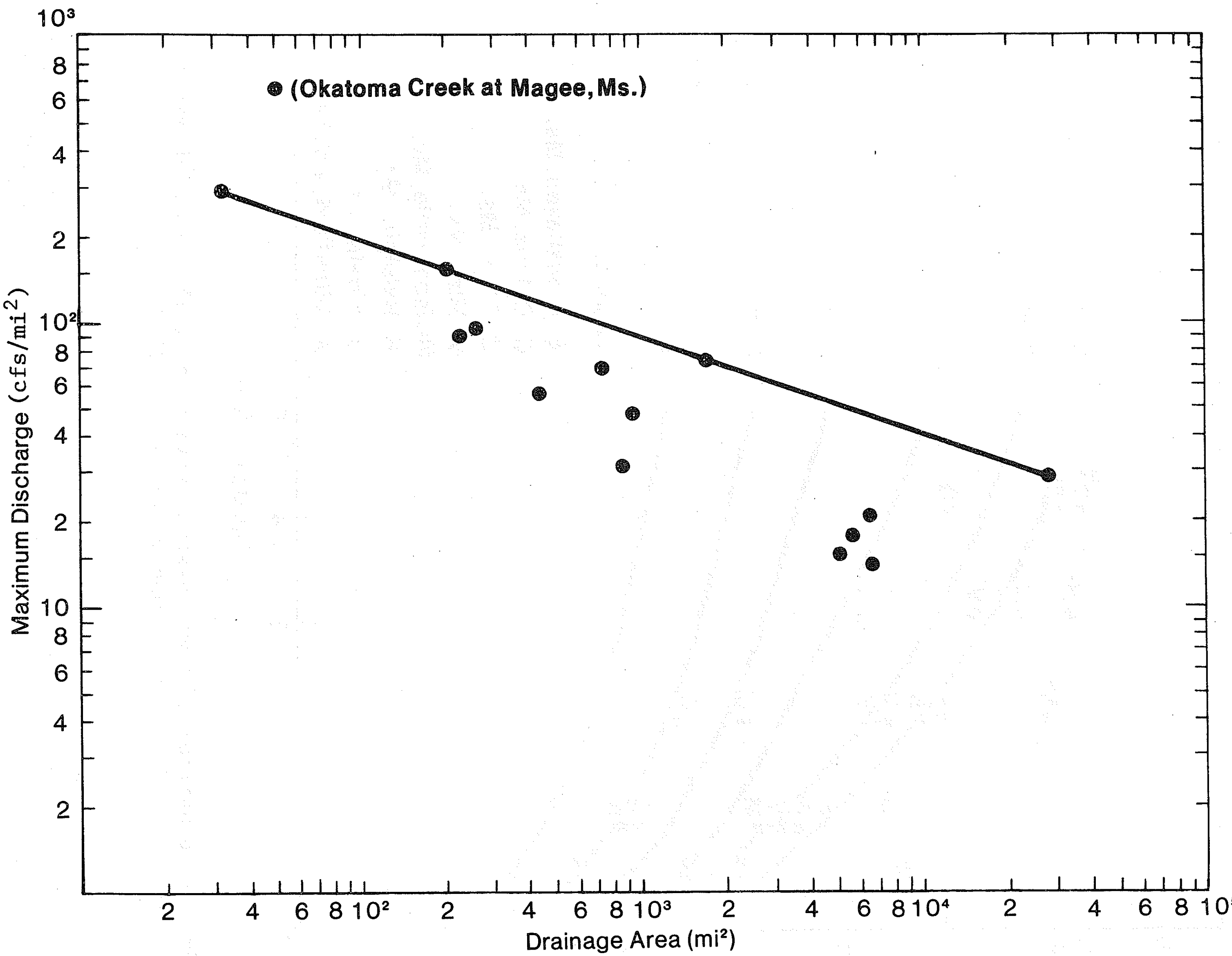


Figure 14.--Maximum discharge (cfs per sq mi) versus drainage area (sq mi).

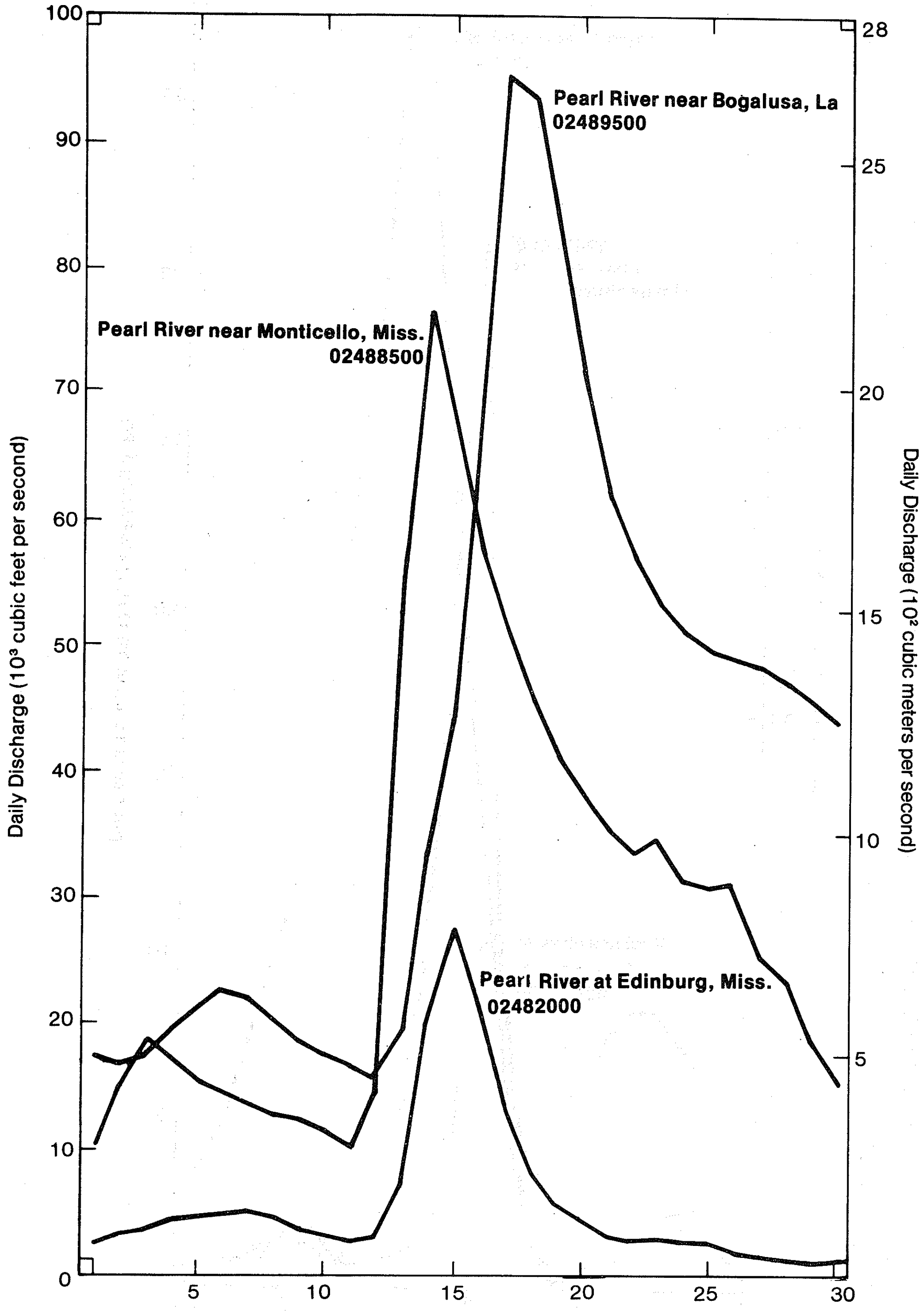


Figure 15a--Comparative discharge hydrographs at selected sites on the Pearl River.

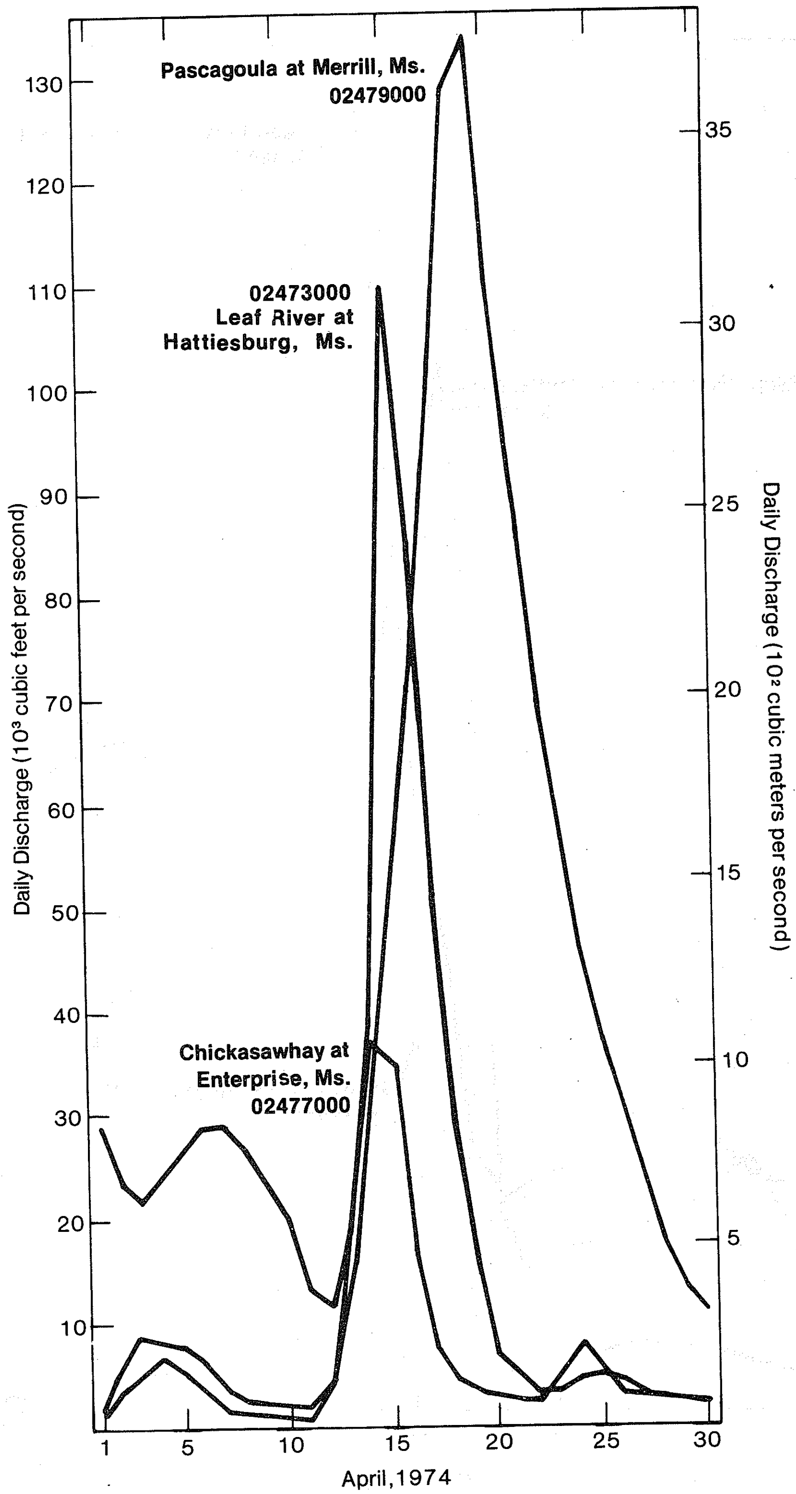


Figure 15b--Comparative discharge hydrographs at selected sites on the Pascagoula River Basin.

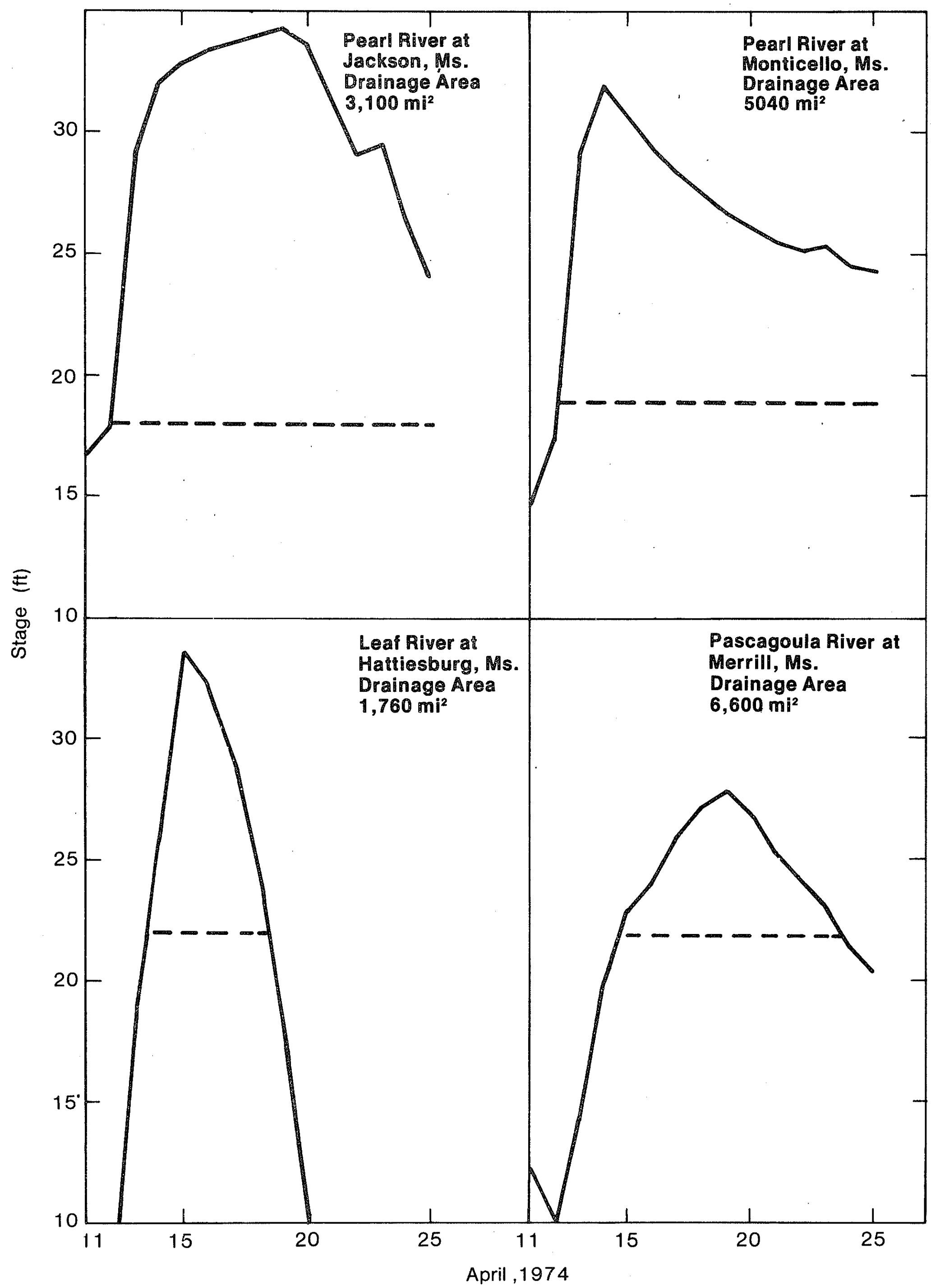


Figure 16--Daily stages for selected sites in the Pascagoula and Pearl River Basins, April 1974. Dashed lines are flood stages.