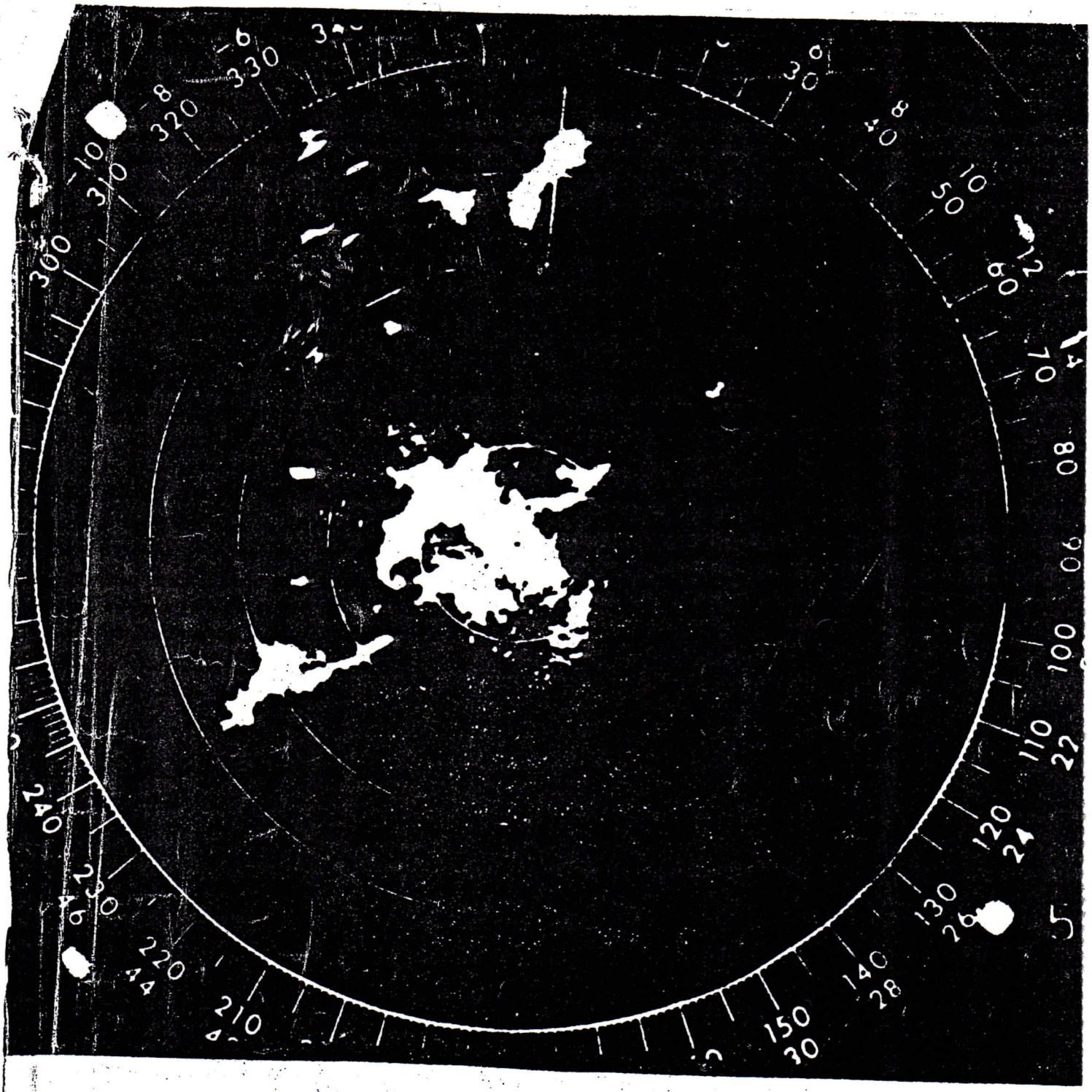
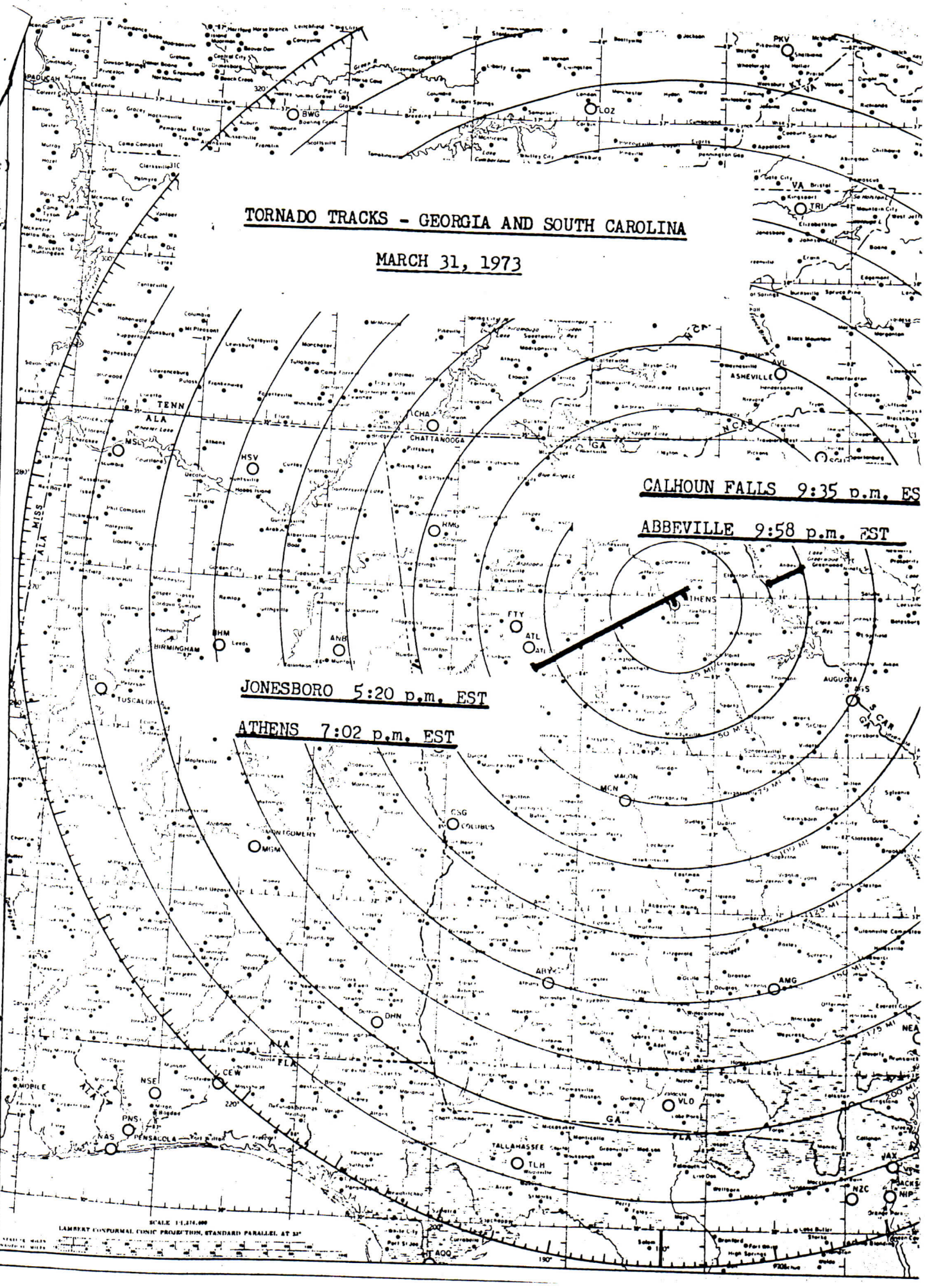
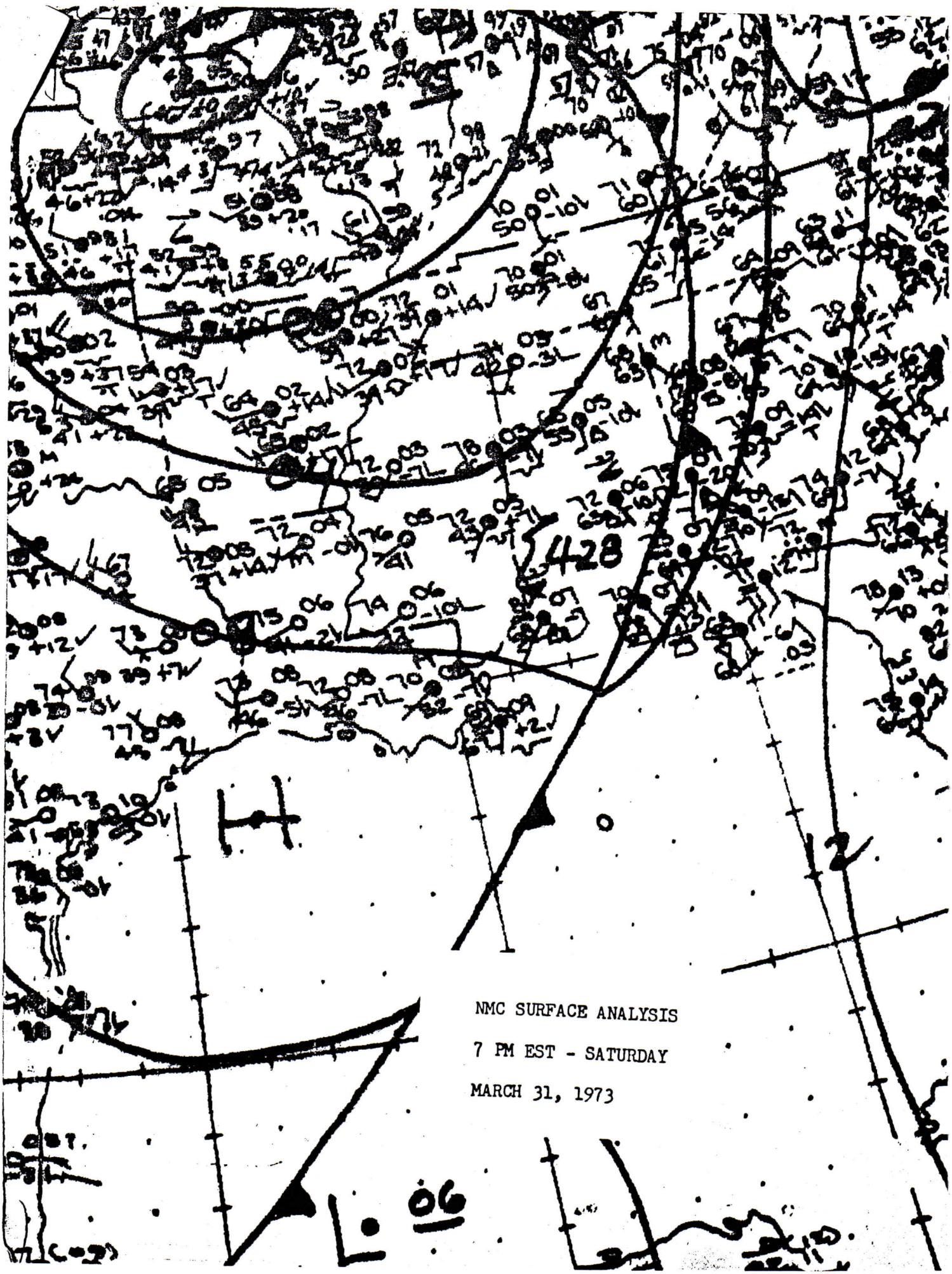


NATURAL DISASTER SURVEY REPORT

GEORGIA - SOUTH CAROLINA TORNADOES

OF MARCH 31, 1973


TORNADO TRACKS - GEORGIA AND SOUTH CAROLINA
MARCH 31, 1973
CALHOUN FALLS 9:35 p.m. ES
ABBEVILLE 9:58 p.m. EST
JONESBORO 5:20 p.m. EST
ATHENS 7:02 p.m. EST
PADUCAH
BWG
LOZ
PKV
TRI
AVL
ASHEVILLE
CHA
CHATTANOOGA
MSL
HSV
RMG
FTY
ATL
ATHENS
BHM
BIRMINGHAM
ANB
TUSCALOOSA
AUGUSTA
AGS
MACON
MCN
CSG
COLUMBUS
MONTGOMERY
MGM
ABY
AMG
DHN
CEW
NSE
PNS
NAS
PENSACOLA
MOBILE
VLD
TALLAHASSEE
TLH
JAX
NZC
NIP
AQQ
TENN
ALA
GA
FLA
MISS
SCALE 1:1,374,000
LAMBERT CONFORMAL CONIC PROJECTION, STANDARD PARALLEL AT 33°



NMC SURFACE ANALYSIS

7 PM EST - SATURDAY

MARCH 31, 1973

PREFACE

PART A. GEORGIA

The Southern Region National Weather Service members of the NOAA Natural Disaster Survey Team investigated the Georgia tornadoes of Saturday, March 31, 1973, and consisted of Jack A. Riley, Chief, Meteorological Services Division, and Harold S. McCrabb, Service Operations Evaluation Meteorologist.

The members arrived in Atlanta on Sunday night, April 1, 1973, and discussed plans with Rheinhart W. Harms, MIC, and David P. Barnes, PA, of the Atlanta WSFO. The next morning, the Southern Region team members met with Major General Joel B. Paris, III, State Civil Defense Director and State Adjutant General, who had flown the path by helicopter, to discuss the event, its impact, and path. A trip was also made to Conyers, the scene of greatest destruction.

That afternoon the Southern Region team journeyed to Athens by automobile on highways which paralleled and closely followed the tornado path, stopping at several points to interview residents and determine the occurrence times of the tornado. Late that afternoon, Southern Region team members accompanied Mr. Ed C. Higdon, Weather Service and Radar Specialist of WSO, Athens, in touring the damage area in Athens. The next morning on Tuesday, the event was reviewed with G. C. Holladay, MIC; B. J. Smith, PA; and other staff members of the Athens WSO. That afternoon a return trip was made to Atlanta to rendezvous at the WSFO with Walter G. Seibert, Chief, Meteorological Services Division, and survey team member of the National Weather Service Eastern Region. Findings and recommendations were discussed, and plans were made to accomplish the survey report.

The Southern Region members of the NOAA Natural Disaster Survey Team are indebted to many people for their contributions to this report. A special word of thanks is extended to the National Weather Service staffs at WSO, Athens and WSFO, Atlanta for their cooperation and assistance. Appreciation is also extended to Dr. T. Theodore Fujita for the copy of his expert analysis of the tornado paths.

detected and followed a hook on its WSR-57 Radar for about 43 minutes and issued timely and effective warnings for Athens and other areas in its county warning area.

6. The Atlanta WSFO and Athens WSO were adequately staffed with six and five persons on duty, respectively. Two of the five persons on duty at WSO, Athens were called in extra an hour or more before the storm hit Athens.

7. Difficulties and delays in notifying news media by telephone, especially in long distance calls involving different telephone companies, were experienced when the Athens WSO called a radio station in Monroe, Georgia with a warning.

8. Dissemination of warnings to areas served by cable television is restricted when the stations on it are not located in the areas served and do not carry warnings for those areas. Athens, Georgia primarily receives television only by cable with all the channels originating at locations 50 or more miles away.

9. Storm spotter feed-back about the Jonesboro tornado to WSFO, Atlanta was excellent, but information to WSO, Athens about the storm as it moved further on was poor.

10. Although a log of actions, telephone calls, etc. is maintained at WSO, Athens, many of them were not recorded during the tornado emergency.

11. The use of Emergency Notification Action Signal (EANS) was requested of the Emergency Broadcast System (EBS) radio station, but inexplicably was not used.

12. Some of the radio stations in Atlanta were not aware of the availability of the VHF-FM system, especially about the tone alert feature to receive warnings.

EXECUTIVE SUMMARY

At 5:28 p.m. EST, Saturday, March 31, 1973 the Fulton County Flight Service Station in Atlanta, Georgia relayed a report from Mr. Ronald L. Teems, a member of the Atlanta Air Route Traffic Control Center, living at 735 South Carter Drive, Jonesboro, Georgia that a tornado had struck Jonesboro at 5:20 p.m. EST. Another report with the same information was received from the public by telephone moments later. Between the time of its formation and touchdown at Jonesboro and its lifting back into the clouds, a few miles northesst Athens at 7:18 p.m. EST, the tornado stayed on the ground nearly the whole distance, traversing a path about 75 miles long, varying in width from a few hundred feet to one-half mile, in an east-northeastward direction, on a heading of 60 degrees, at an average speed of 38 mph. The detailed survey and investigation of the storm by Dr. T. Theodore Fujita of the University of Chicago shows a break in the tornado path a few miles west of Monroe, Georgia, suggesting the possibility of two separate tornadoes; however, the paths are almost in direct line with each other; and it is fairly certain that the tornado or tornadoes came from the same storm system. Dr. Fujita plots a path 32 miles long with width of 0.3 to 0.9 mile for the Conyers tornado and a path of 36 miles long with widths of 0.4 to 1.0 mile for the Athens tornado.

By coincidence the tornado path paralleled and closely followed highways and could be seen most of the time in travelling by automobile from Monroe to Athens. Property damage was estimated at $113 million causing it to be one of the worst catastrophes in the history of Georgia. Several cities and towns in the path of the storm suffered major damage. Hardest hit were Conyers and Athens. Amazingly, in the Georgia tornado, there were only two deaths. And of the 300 to 350 reported injuries, there were only about 15 persons still hospitalized two days after the storm.

The South Carolina tornado developed and touched down about two miles west of Calhoun Falls, about three miles from the Georgia-South Carolina border, at about 9:35 p.m. EST and moved east-northeastward to just north of Abbeville about 10:00 p.m. EST. This tornado travelled approximately 16 miles on a heading of 60 degrees at a speed of approximately 42 mph. Dr. Fujita's survey showed the Abbeville tornado path about 36 miles long, beginning just east of Calhoun Falls to a few miles north of Abbeville and then east-northeastward for another 16 miles into Greenwood County with widths varying from 0.2 to 0.5 mile.

On the eastern outskirts of Calhoun Falls a motel and several homes were destroyed. Five of the seven deaths in South Carolina occurred in the destruction of the motel. The second area of major damage was in the residential areas to the northwest, north, and northeast of Abbeville, In this area the

other two deaths occurred. One was a seven year old girl who was killed when her home was demolished. The other fatality was a sixteen year old boy who was killed when a large tree fell and crushed him.

In South Carolina there was a total of 7 deaths and 50 injuries. Damages were estimated at $3 million. About 100 homes were destroyed and 125 others damaged.

Findings

Part A. Georgia

1. The total warning system functioned in an efficient enough manner to produce positive public response by a large segment of the population and probably minimized potential loss of life. Both the warnings and the educational efforts to inform the public about tornado safety rules contributed to the low death rate of only two persons despite immense property loss.

2. Advanced preparedness planning for alerting public safety officials and news media to the development of severe local storms and tornadoes proved very effective. Warnings and other severe weather releases were broadcast without delay. Likely, only about half of the public heard the specific warnings, but nearly all of them were aware that severe weather was in the offing.

3. All NOAA basic data collection and communication systems performed satisfactorily without interruption except the WSR-57 Radar at WSO, Athens was knocked out of operation for about one-half hour beginning about the time that the tornado hit Athens. This outage had no significant effect on the warning process.

4. NOAA's National Weather Service operation was most effective in warning the public and in keeping them informed about severe weather because the responsible National Weather Service Offices had the facilities (radar, excellent communications, and action plans) and the capability to act promptly and responsibly on recognizing a severe storm situation. The staffs exercised skill and judgment in their warnings and statements throughout the day and evening of March 31, 1973. Lead times of the tornado warnings for Conyers and Athens were 15 to 20 minutes with other types of severe weather warnings and statements issued much earlier.

5. Radar played a very significant role in enabling NWS Offices to issue timely and effective warnings and information releases. The Atlanta WSFO related the report of the Jonesboro tornado to an echo on their WSR-3 local use radar and issued timely warnings for downstream areas. The Athens WSO

Recommendations

Part A. Georgia

1. NOAA's National Weather Service should continue its vigorous support and assistance in preparing community preparedness plans. Establish Emergency Preparedness positions.

2. Time and resources should be given to establishing a more effective statewide corps of trained tornado spotters. Probably the most feasible and effective means to accomplish this goal in Georgia is to promote greater reporting of storms on NAWAS by the State Police and other agencies which feed into this system. The Atlanta WSFO already provides spotter training to State In-Service classes at the Georgia Police Academy in Atlanta on a regularly scheduled basis. The need and value of timely storm reports to the National Weather Service should be emphasized.

3. National Weather Service offices with county warning responsibility should be provided with modern local use radar to supplement and complement the WSR-57 Radar network.

4. Expand VHF-FM systems and promote and publicize the tone alert feature. Establish a tone alert test program. Tests should be conducted periodically, minimally at the beginning of the tornado season.

5. NOAA's National Weather Service should continue to encourage additional news media to participate in the NOAA Weather Wire Service.

6. More systematic procedures in maintaining severe weather logs should be instituted by all radar offices and all offices with warning responsibility.

CHAPTER I. Description and Impact of the Tornadoes

A. The Georgia Tornado

The area from Jonesboro, about fifteen miles south of downtown Atlanta, to Athens, Georgia consists principally of timbered rolling hills generally varying in elevation from 800 to 1200 feet. Only four towns of appreciable size and population are along this path. The four towns and their 1970 population figures are Jonesboro 4,105; Conyers 4,890; Monroe 8,071 and Athens 44,342. Nearby Atlanta, however, totals 497,421 and the Atlanta Standard Metropolitan Statistical Area (SMSA) number is 1,390,164. Other communities in the Atlanta area hit by the tornado were Morrow 3,708 and Stockbridge with 1,201 persons. The tornado paralleled and closely followed highways which are spotted with small houses, trailers, barns, and small stores alongside. The most amazing aspect of the event was the great amount of damage and so little loss of life on that Saturday afternoon and evening ~~on Saturday,~~ March 31, 1973. Fortunately, the tornado struck on the western and northern edge of the more populated towns of Conyers and Athens and just north of Monroe.

The tornado first formed and touched down in the small communities of Jonesboro and Morrow in Clayton County. Thunderstorms were occurring southwest of this area earlier and as they move northeastward one person stated he saw the tornado form and touchdown near a high school and community center at Jonesboro at 5:20 p.m. EST. Jonesboro is only seven miles south of the Atlanta Airport. The tornado moved east-northeastward striking Stockbridge in Henry County and at 5:58 p.m. EST hit the western and northern portions of Conyers in Rockdale County and then two to three miles north of Monroe at 6:25 p.m. EST. It then proceeded on the ground all the way to Athens where it hit on the west and north portions at 6:58 - 7:02 p.m. EST and then to Swamp Guinea near Colbert in Madison County, about 10 miles east-northeast of Athens, at 7:18 p.m. EST. The DCPA Director of Madison County states he saw the tornado withdraw into the clouds at this point. The approximate path length is 75 miles and the width varied from one-half mile to a few hundred feet. The one-half mile width was noted at Conyers where the most damage occurred. The tornado stayed on the ground most of the way with some difficulty in following it continuously from Jonesboro to near Monroe but definitely on the ground all the way from a few miles west-southwest of Monroe to Athens. The entire path was flown by helicopter and marked by Major General Joel B. Paris, III, state Civil Defense director and state adjutant general, who discussed the path and other aspects of the storm with the NOAA Survey Team. Rather astonishingly, most of the tornado path was viewed by driving along the highway. Driving from west-southwest of Monroe to Athens on U. S. Highway 78, one hardly lost sight of the path. It paralleled the highway on the south and crossed over to the north side a few miles west-southwest of Athens. Most of the debris was blown and trees were snapped off to the east-northeast in the direction of the storm movement, but occasionally one could see trees felled in one direction on

one side of the highway and in the opposite direction on the other side. It is astounding that automobiles travelling from Athens west-southwestward were not strewn along the road. The tornado moved east-northeastward, at 060 degrees with an average speed of 38 mph.

The only reports of funnel sightings were in the Athens area. A Mr. Mark Arnold, student at the University of Georgia, said he saw the tornado funnel with flying debris ahead of him as he was driving his car and slowed to keep from overtaking it. The DCPA Director of Madison County stated he saw the funnel withdraw into the clouds. Most people interviewed stated they heard a loud noise as the storm struck. Heavy rain and hail of various sizes accompanied the storm much of the way. In Athens some reported rain only on either side of the storm. Most people outside said they knew it was a tornado by the blackness of the storm.

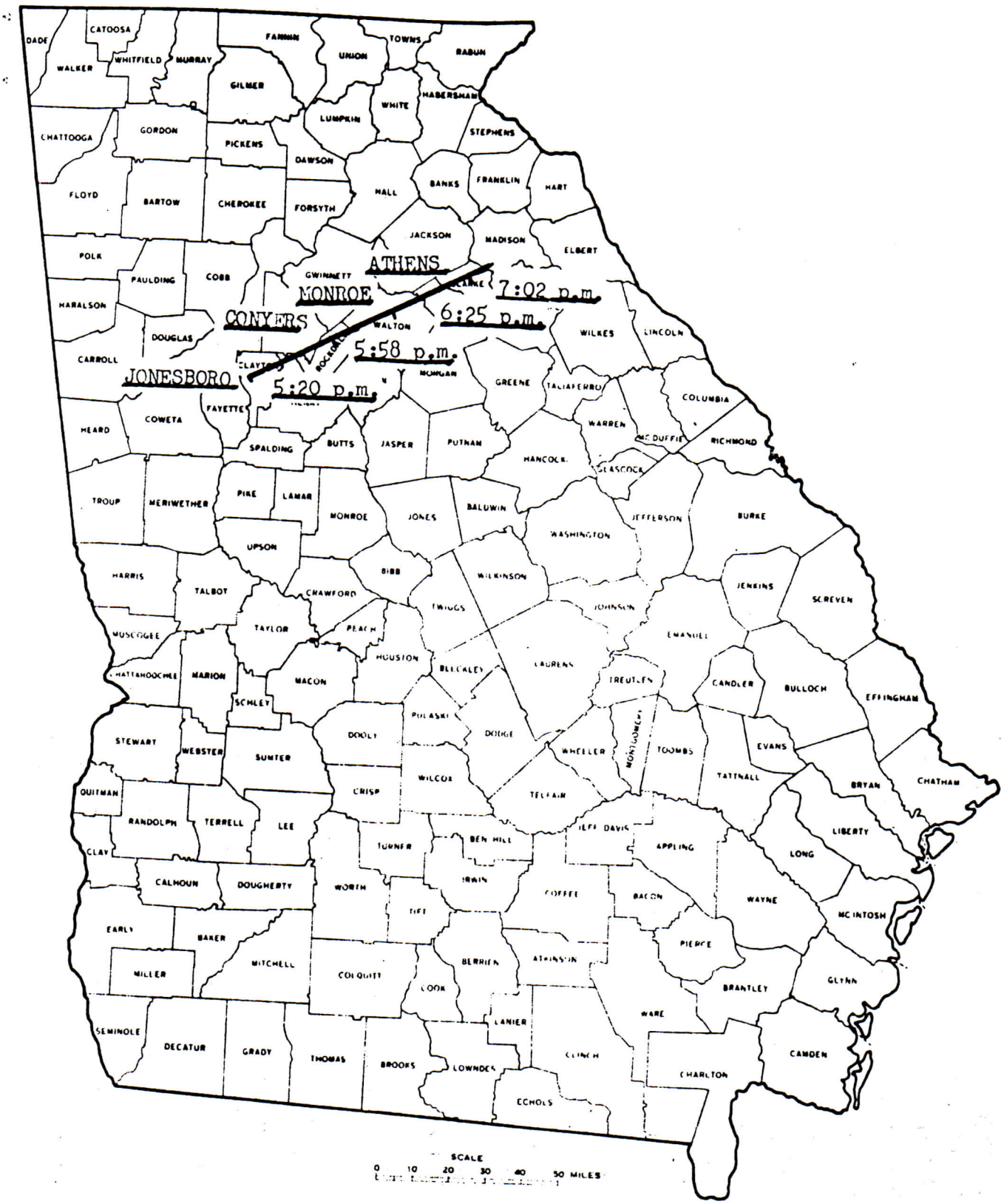
Governor Jimmy Carter called the storm damage the worst natural disaster in terms of damage ever to hit the State of Georgia. Two deaths were reported. On the north side of Athens on U. S. Highway 441 a Mrs. Peggy Hix was killed when the pickup truck in which she and Mr. Hix and their child were visiting was overturned. One newspaper account said the truck was picked up and thrown over power lines and slammed into a liquor storewhich was also destroyed. The newspaper quotes Mr. Hix as saying he heard the warnings but thought the storm had already passed as he drove into the strong winds and stopped. The other victim was a Mr. Neal Broach, 39, of Monroe who was walking to his car after visiting friends at their mobile home just off the highway about 3 or 4 miles west of Monroe. The mobile home was overturned and destroyed, killing Mr. Broach and seriously injuring two of the occupants. Injuries from the tornado were estimated at 300; but on April 2, only 15 persons were still reported in the hospital.

The total estimated damage as of April 3 was $113,654,200 up from the first estimate of $104,529,200. Four hundred homes were destroyed; 1,784 homes were damaged; total home damages were $24,101,600; 32 businesses were destroyed; 76 businesses were damaged estimated at $73,415,000. Worst damage was in Rockdale County (contains Conyers) at $75 million. In the western part of Conyers all eight major facilities were damaged in the industrial park. Business damages alone in Conyers are estimated at $69,231,000. Timber damage in Clarke County (contains Athens) alone is estimated at $12 million. In Athens immense trees were uprooted and fell against homes. In other places they were snapped or twisted off at 10-15 feet above the ground. Numerous telephone and power lines were knocked out. In Conyers two and two and a half foot diameter new poles were snapped off at the ground. On one side of the road poles would lay east and on the other side west. Much of Conyers was still without electricity on Monday, April 2.

An estimated "several hundred" mobile homes were demolished or damaged. Four mobile home parks, two near Stockbridge and two near Athens, were virtually wiped out. Few, if any, of these homes were tied down. Mrs. Marguerite Brock, state civil defense information officer, was quoted as saying that 98 percent of the 66,842 mobile homes (1970 census) in Georgia are not tied down.

TRACK OF TORNADO - MARCH 31, 1973

GEORGIA



THE UNIVERSITY OF CHICAGO
DEPARTMENT OF THE GEOPHYSICAL SCIENCES
5734 SOUTH ELLIS AVENUE
CHICAGO • ILLINOIS 60637

April 9, 1973

Thank you very much for your assistance in my tornado survey last week in Georgia and South Carolina.

On April 4 (Wednesday), Ed Pearl and I covered the entire area of tornadoes by air to determine the extent and intensity of damage.

A large chart with 3 sectional maps includes the directions of tree falls and damage areas in F scale as mapped from Cessna 172 flying 500 to 1000 ft above the ground.

The three small charts indicate the damage areas of three tornadoes which may be called the

CONYERS TORNADO	F 3 or F 4, 32-mile long, 0.3-0.9 mile wide
ATHENS TORNADO	F 3 or F 4, 36-mile long, 0.4-1.0 mile wide
ABBEVILLE TORNADO	F 4 or F 5, 24-mile long, 0.2-0.5 mile wide

On April 5 (Thursday), I took a 7-hour helicopter trip to photograph damage areas from 200 to 500 feet above the terrain. Both 35mm color photos and super 8 movies were shot. They are being processed in Chicago.

If you wish to obtain copies of damage pictures, please let me know. I shall be happy to send them to you.

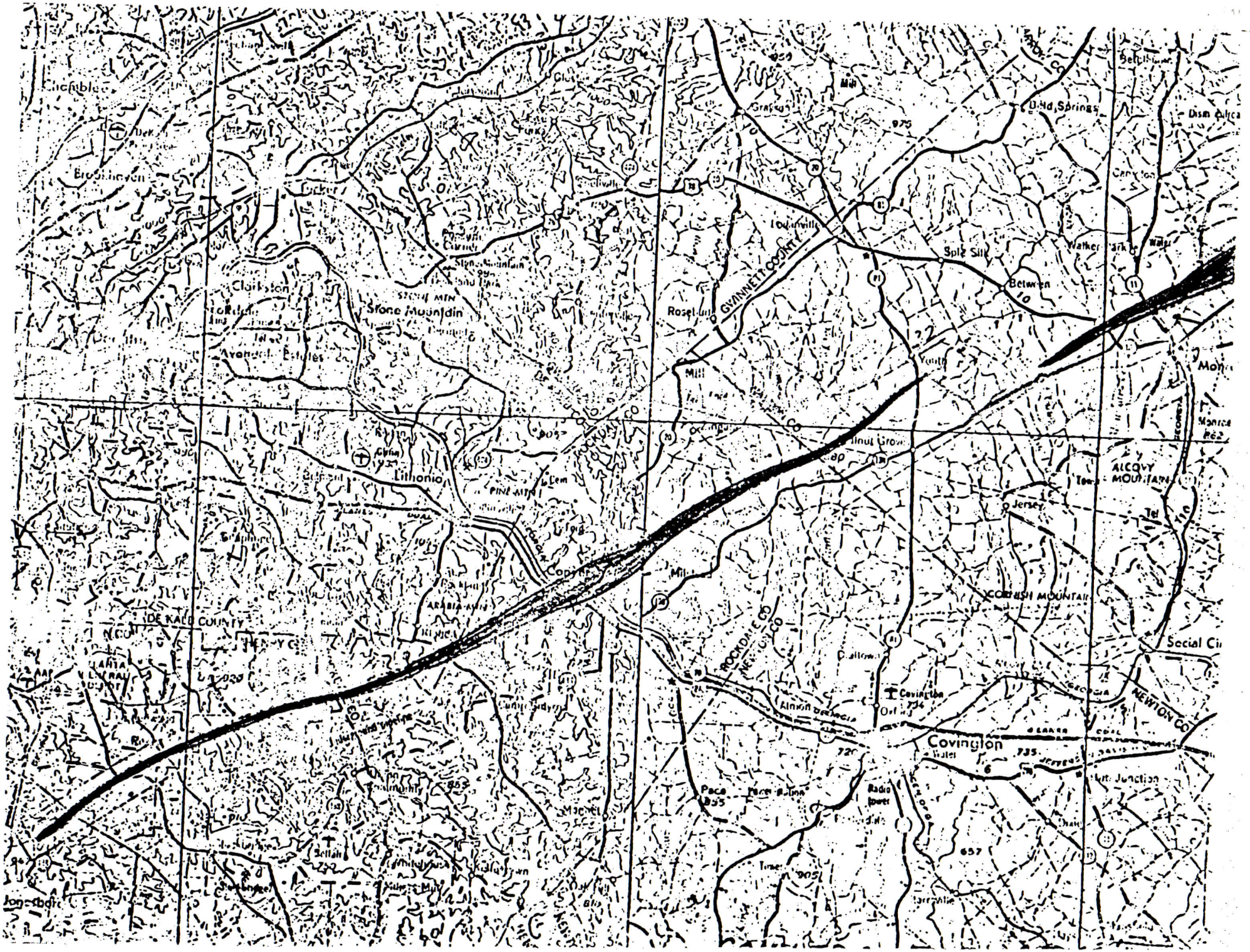
This is a quick report on the March 31 tornadoes. A detailed report will be sent to you in approximately one month. Please let me know of your comments.

Sincerely,

Ted Fujita

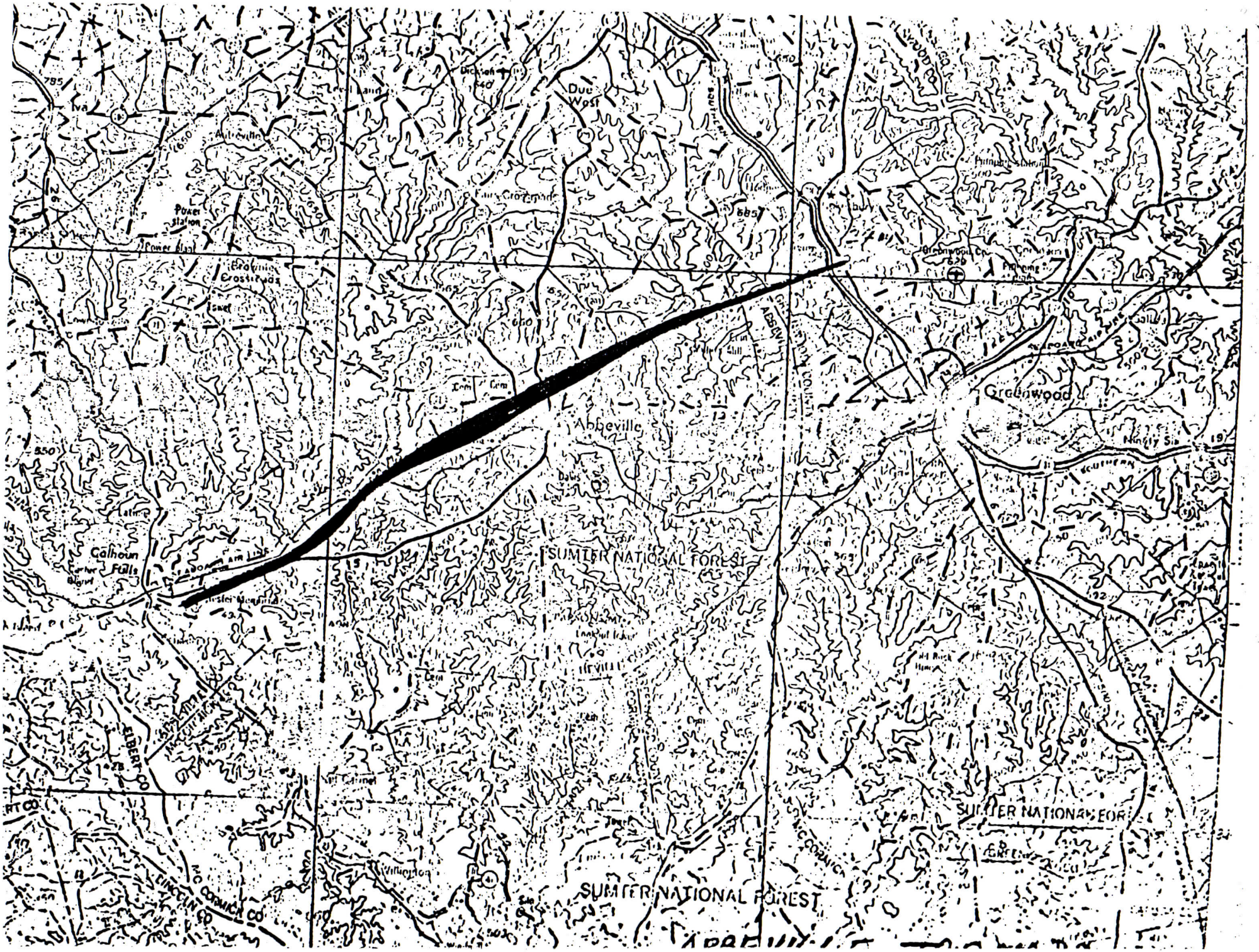
T. Theodore Fujita
Professor Meteorology

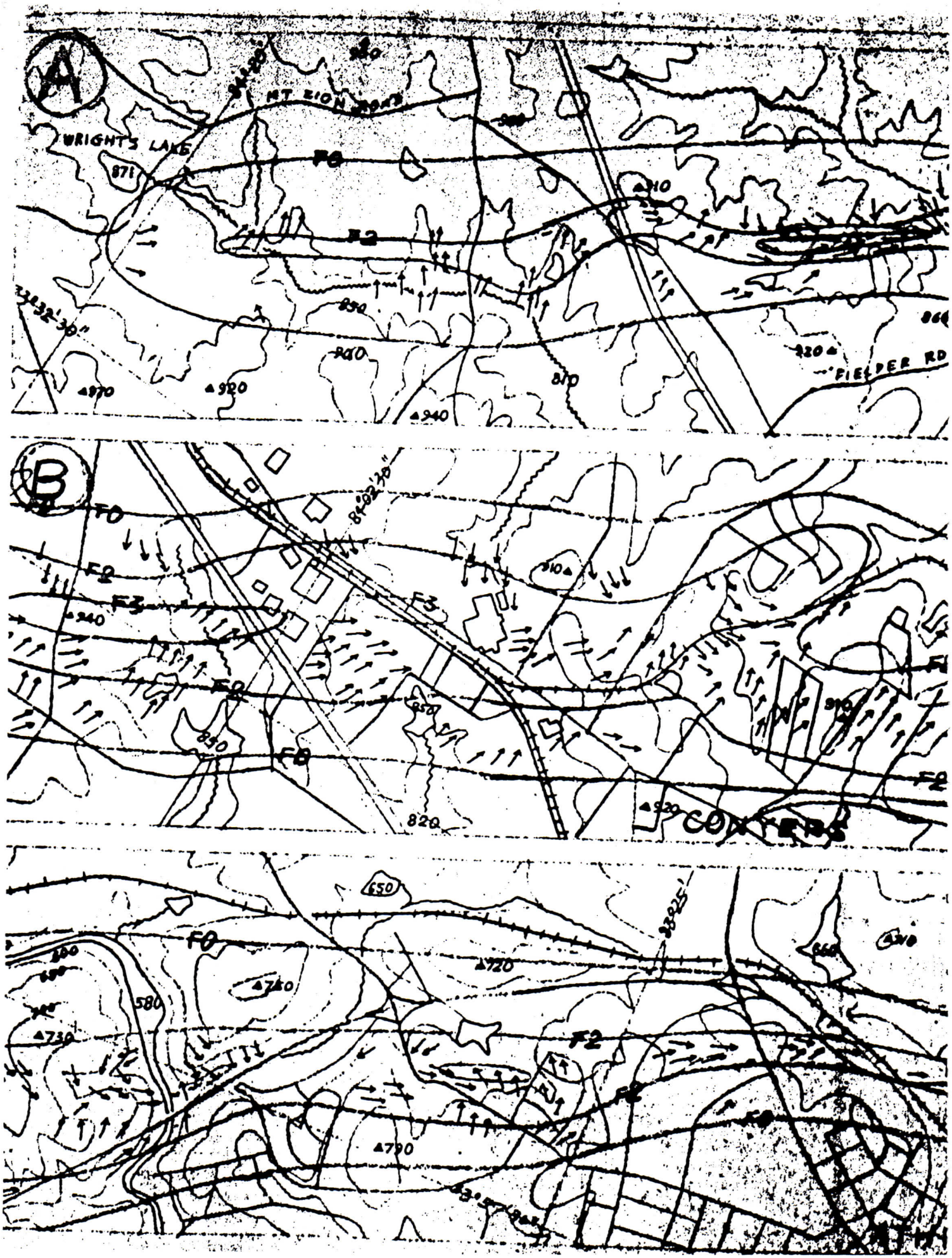
National Weather Service Forecast Office
Atlanta, Athens, Columbia, Greenville
Mr. Harold S. McCrabb
Dr. Karl R. Johannessen
Mr. Allen D. Pearson



Chamblee
Brookhaven
Clarkston
Stone Mountain
Avondale Estates
Lithonia
Copyer
DE KALB COUNTY
GWINNETT COUNTY
ROCKDALE CO
NEWTON CO
Lodgeville
Roseland
Mill
Grayson
Bold Springs
Split Silk
Between
Walker Park
Youth
Jersey
ALCOVY MOUNTAIN
CORNISH MOUNTAIN
Social Ci
Covington
Almon
Pace
Radio tower
Hut Junction
Jonesboro

Jackson Trail Monument
Arcade
Tower
JACKSON CO
BARROW CO
MADISON CO
CLARKE CO
Winder
Winder
Russell
Winder 943
Towers
GWINNETT CO
BARROW CO
Bethlehem
Bold Springs
Dism railroad
WALTON CO
Gratis
Campton
Eastville
Wallinsville
ATHENS
Athens 807
Water
Sold Silk
Walker Park
Between
Mount Vernon
Snows Mill
TURKEY CREEK MOUNTAIN
JACKS CREEK MOUNTAIN
OCONEE CO
High Shoals
Bishop
Power plant
Garnett Shoals Dam
Monroe
Good Hope
Pannell
Monroe 862
ALCOVY MOUNTAIN
Jersey
Ebenezer
Fairplay
CORNISH MOUNTAIN
WALTON CO
MORGAN CO
GREENE COUNTY
CLARKE CO
GREENE CO


Due West
Dickson
Iva
Power station
Power plant
Crossroads
Abbeville
Greenwood
Calhoun Falls
SUMTER NATIONAL FOREST
SUMTER NATIONAL FOREST
SUMTER NATIONAL FOREST
ELBERT CO
McCORMICK CO
LINCOLN CO
Williamston
Ninety Six


A
MT ZION ROAD
WRIGHTS LAKE
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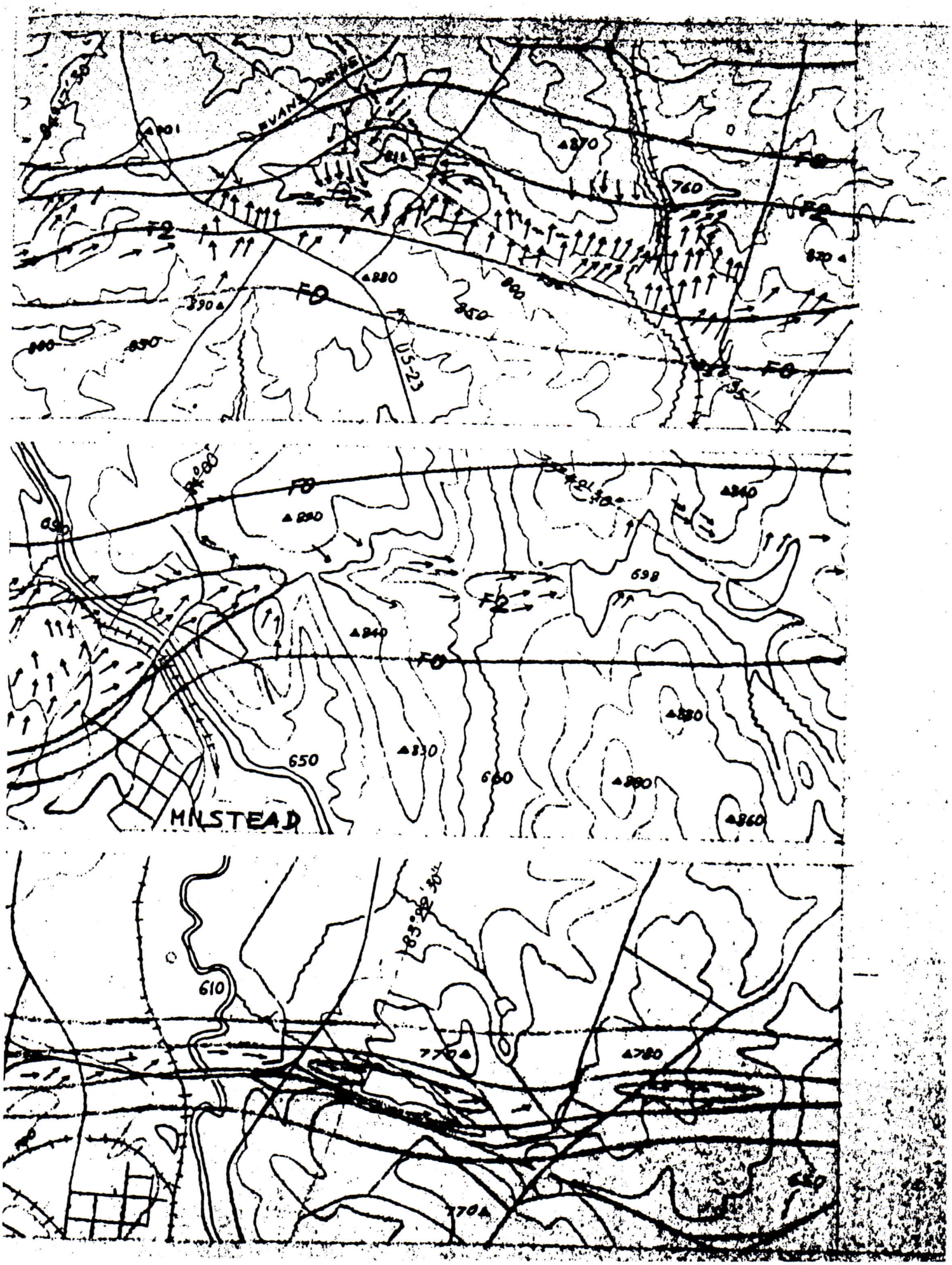

EVANS DRIVE
F0
F2
US-23
760
880
890
850
800
830
840
698
650
660
860
MILSTEAD
610
770
780
650

TOTAL

DAMAGE ESTIMATES

AGRICULTURE----------		$ 225,000.00
NON-AGRICULTURE----------		$ 50,000.00
PUBLIC PROPERTY----------		$ 125,000.00
PRIVATE PROPERTY:		
No. of houses damaged----------1784		$ 11,773,900.00
No. of houses destroyed-------- 400		$ 12,477,700.00
No. of homeless people---------2250		
No. of businesses damaged------ 76		$ 894,600.00
No. of employees out of work--- 655		
No. of businesses destroyed---- 32		$ 72,296,000.00
No. of employees out of work--- 743		
UTILITIES----------		$ 650,000.00
TIMBER DAMAGE----------		$ 4,935,000.00
Debris clearance		$ 1,075,000.00
Auto,camper,&boat damage		$ 27,000.00

TOTAL $ 104,529,200.00

Athens-Clarke County

DAMAGE ESTIMATES

AGRICULTURE			$ 0.00
NON-AGRICULTURE			$.
PUBLIC PROPERTY			$.
PRIVATE PROPERTY:			
No. of houses damaged	525	$	1,283,900.00
No. of houses destroyed	189	$	6,264,000.00
No. of homeless people	800		
No. of businesses damaged	39	$	530,600.00
No. of employees out of work	500		
No. of businesses destroyed	18	$	2,815,000.00
No. of employees out of work	168		
UTILITIES			$ 500,000.00
TIMBER DAMAGE			$ 4,000,000.00

Derbis clearance $ 1,075,000.00

TOTAL $ 16,468,500.00

Conyers-Rockdale County

DAMAGE ESTIMATES

AGRICULTURE		$ 0.00
NON-AGRICULTURE		$ 0.00
PUBLIC PROPERTY		$ 0.00
PRIVATE PROPERTY:		
No. of houses damaged	280	$ 3,370,000.00
No. of houses destroyed	85	$ 2,250,000.00
No. of homeless people	450	
No. of businesses damaged	20	$ 114,000.00
No. of employees out of work	75	
No. of businesses destroyed	12	$ 69,231,000.00
No. of employees out of work	530	
UTILITIES		$
TIMBER DAMAGE		$ 35,000.00

TOTAL $ 75,000,000.00

Clayton County

DAMAGE ESTIMATES

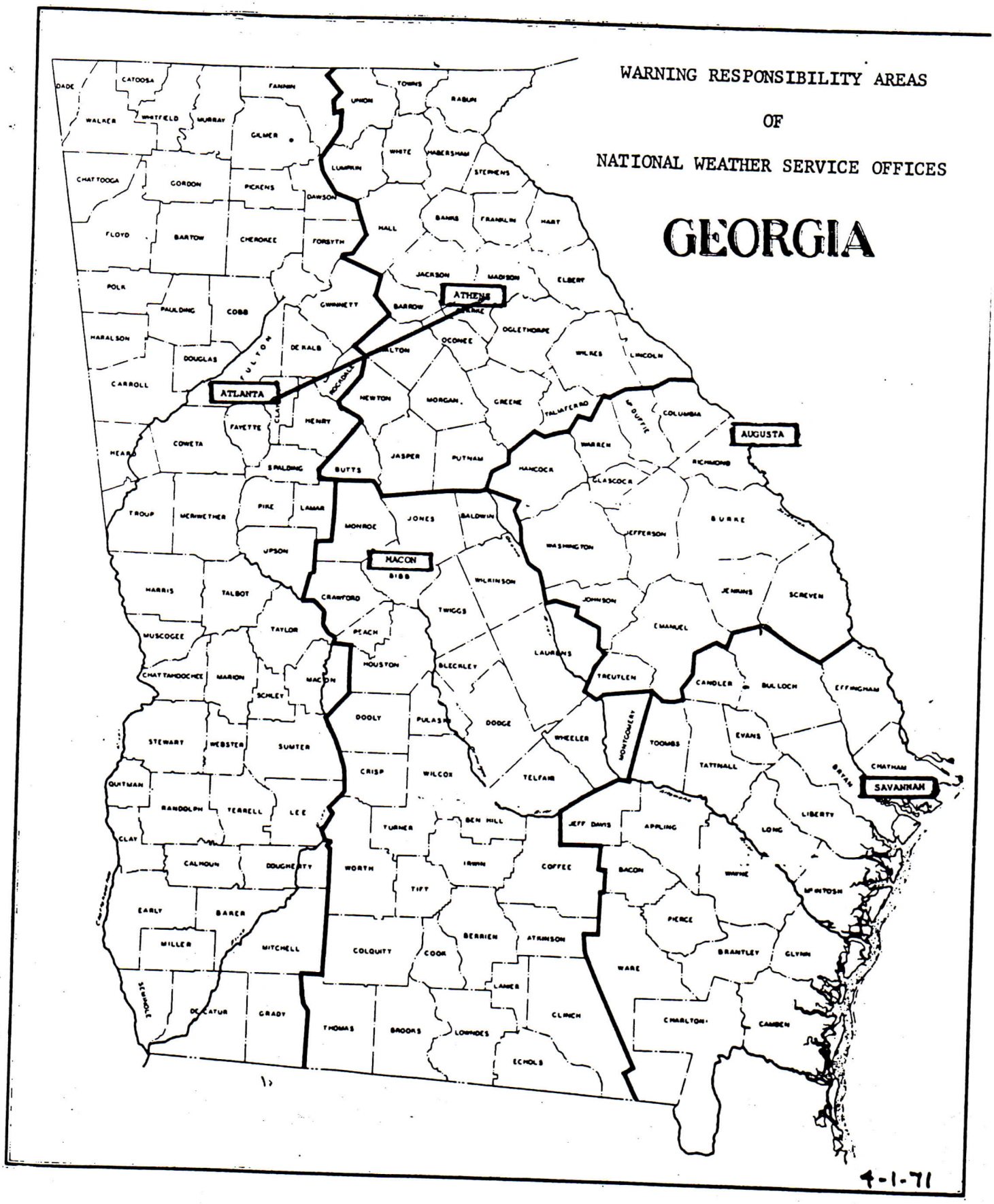
AGRICULTURE			$ 100,000.00
NON-AGRICULTURE			$ 50,000.00
PUBLIC PROPERTY			$ 50,000.00
PRIVATE PROPERTY:			
No. of houses damaged	941	$	7,000,000.00
No. of houses destroyed	75	$	3,500,000.00
No. of homeless people	500		
No. of businesses damaged	15	$	250,000.00
No. of employees out of work	80		
No. of businesses destroyed	1	$	250,000.00
No. of employees out of work	30		
UTILITIES			$ 150,000.00
TIMBER DAMAGE			$ 800,000.00

TOTAL $ 12,150,000.00

Monroe-Walton County

DAMAGE ESTIMATES

AGRICULTURE----------		$	125,000.00
NON-AGRICULTURE----------		$	0.00
PUBLIC PROPERTY----------		$	75,000.00
PRIVATE PROPERTY:			
No. of houses damaged----------	38	$	120,000.00
No. of houses destroyed--------	51	$	463,700.00
No. of homeless people---------	500		.
No. of businesses damaged------	2	$	.
No. of employees out of work---	0		
No. of businesses destroyed----	1	$	.
No. of employees out of work---	15		
UTILITIES----------		$	.
TIMBER DAMAGE----------		$	100,000.00
Auto, camper and boat damage		$	27,000.00
TOTAL		$	910,700.00


WARNING RESPONSIBILITY AREAS
OF
NATIONAL WEATHER SERVICE OFFICES
GEORGIA
ATHENS
ATLANTA
AUGUSTA
MACON
SAVANNAH
DADE
CATOOSA
WALKER
WHITFIELD
MURRAY
FANNIN
GILMER
UNION
TOWNS
RABUN
CHATTOOGA
GORDON
PICKENS
DAWSON
LUMPKIN
WHITE
HABERSHAM
STEPHENS
FLOYD
BARTOW
CHEROKEE
FORSYTH
HALL
BANKS
FRANKLIN
HART
POLK
PAULDING
COBB
GWINNETT
BARROW
JACKSON
MADISON
ELBERT
HARALSON
DOUGLAS
DE KALB
OCONEE
OGLETHORPE
WILKES
LINCOLN
CARROLL
FULTON
ROCKDALE
NEWTON
MORGAN
GREENE
TALIAFERRO
WARREN
COLUMBIA
MC DUFFIE
HEARD
COWETA
FAYETTE
CLAYTON
HENRY
SPALDING
BUTTS
JASPER
PUTNAM
HANCOCK
GLASCOCK
RICHMOND
TROUP
MERIWETHER
PIKE
LAMAR
MONROE
JONES
BALDWIN
WASHINGTON
JEFFERSON
BURKE
UPSON
WILKINSON
JOHNSON
JENKINS
SCREVEN
HARRIS
TALBOT
CRAWFORD
TWIGGS
EMANUEL
MUSCOGEE
TAYLOR
PEACH
HOUSTON
BLECKLEY
LAURENS
TREUTLEN
CANDLER
BULLOCH
EFFINGHAM
CHATTAHOOCHEE
MARION
SCHLEY
MACON
DOOLY
PULASKI
DODGE
WHEELER
MONTGOMERY
TOOMBS
EVANS
TATTNALL
CHATHAM
STEWART
WEBSTER
SUMTER
CRISP
WILCOX
TELFAIR
QUITMAN
RANDOLPH
TERRELL
LEE
BEN HILL
JEFF DAVIS
APPLING
LIBERTY
LONG
CLAY
CALHOUN
DOUGHERTY
WORTH
TURNER
IRWIN
COFFEE
BACON
WAYNE
MC INTOSH
EARLY
BAKER
TIFT
PIERCE
MILLER
MITCHELL
COLQUITT
BERRIEN
ATKINSON
BRANTLEY
GLYNN
WARE
SEMINOLE
DECATUR
GRADY
THOMAS
BROOKS
LOWNDES
LANIER
CLINCH
CHARLTON
CAMDEN
ECHOLS
4-1-71

National Weather Service

FORECAST ZONES FOR GEORGIA BY COUNTIES

Revised 3-1-70

CHAPTER II. Summary of Warning Service

Part A. Georgia

Early Saturday morning rain and thundershowers prevailed over central and northern Georgia. At 7:40 a.m. EST, WSFO, Atlanta issued a Flash Flood Watch for Georgia north of Columbus-Macon-Augusta line. Morning local zone, and state forecasts for Georgia called for showers and thunderstorms to end with the passage of a cold front in the west portion of the state in the afternoon and elsewhere by nightfall. Early in the afternoon, general rainfall ended but scattered showers and thunderstorms continued. The Flash Flood Watch was cancelled at 1:45 p.m. EST.

At 2:15 p.m. EST a Severe Thunderstorm Warning was issued by WSFO, Atlanta for three counties in west-central Georgia, based on radar indications from the Athens, Centerville, and Atlanta radars. It was cancelled at 2:55 p.m. EST.

Around 4:30 p.m., WSO, Athens called WSFO, Atlanta on the radar hotline that thunderstorm activity approaching the Atlanta area looked severe and was increasing in intensity. On the basis of this report and analysis using the local use radar, WSR-3, WSFO, Atlanta issued a Severe Weather Statement at 4:40 p.m. EST stating that a line of thunderstorms was moving across the Atlanta Metropolitan area and would be accompanied by heavy rain, gusty winds, and a chance of hail. At the same time, the Radar Weather Summary from WSO, Athens indicated an area of thundershowers with moderate to heavy activity southeast to northeast of Atlanta. Scheduled afternoon forecasts for the northern portion of Georgia continued the chance of showers and thunderstorms throughout the evening. Also, based on radar, WSO, Athens issued Severe Thunderstorm Warnings at 5:00 p.m. and 5:25 p.m. EST for several counties to the north of Athens.

At 5:28 p.m. EST two nearly simultaneous reports were received at WSFO, Atlanta from the public that Jonesboro had been struck by a tornado. The first of these reports came through the Atlanta Flight Service Station from one of its employees at home in Jonesboro. Then the tornado was related to an apparent "severe" cell on the local use, WSR-3, radar; and a Tornado Warning was immediately issued for persons in Clayton, Henry, Dekalb, and Rockdale counties. The warning's heading indicated an issuance time of 5:35 p.m. EST, but it was distributed on NAWAS at 5:29 p.m. EST, Station WSB (EANS requested) at 5:30 p.m. EST, VHF/FM at 5:32 p.m. EST, NWWS at 5:36 p.m. EST, and RAWARC at 5:40 p.m. EST, All four of the counties were struck by the tornado. This warning was issued 25-30 minutes before the tornado struck Conyers. After this time several more storm reports were received. Also, at 5:38 p.m. EST, a 5:35 p.m. EST headed Severe Thunderstorm Warning was issued by WSFO, Atlanta for five counties southwest of the tornado area. This warning was being issued when the tornado report was received and was delayed until after sending the tornado warning. WSFO, Atlanta later also sent a Severe Weather Statement and several Severe Thunderstorm Warnings for

other areas. Emergency warning operations ended at Atlanta around 1:00 a.m. on April 1, 1973.

At 5:40 p.m. EST, WSO, Athens issued a Tornado Warning for persons in Newton County. This warning was based on radar and from the tornado report at Jonesboro and in coordination with the 5:35 p.m. EST Tornado Warning issued by Atlanta. At 6:00 p.m. EST, WSO, Athens issued a Severe Thunderstorm Warning for persons in Banks, Barrow, Clarke, Habersham, Hall, Jackson, Lumpkin, Raburn, Stephens, Walton, White, and Oconee counties. This warning was based on radar. No reports of a tornado had been received since the Jonesboro report. This warning preceded the tornado near Monroe by about 25 minutes and at Athens by an hour.

At 6:20 p.m. EST, WSO, Athens issued a Tornado Warning for persons in Morgan and Walton (contains Monroe) counties. This warning was based primarily on a radar hook echo first detected at 6:15 p.m. EST and located 5 miles west of Monroe, Georgia at 6:19 p.m. EST. This warning was issued about the time of the death west of Monroe and preceded the area north of Monroe by 5 or more minutes.

At 6:35 p.m. EST, WSO, Athens issued a Tornado Warning for persons in Barrow, Clarke (contains Athens), Jackson, Oconee and Madison counties. This warning was based primarily on a radar hook located 10 miles northeast of Monroe or 19 miles west-southwest of Athens at 6:30 p.m. EST. Also, however, when Radio Station WMRE at Monroe (Walton County) was reached by telephone around 6:30 p.m. EST with the 6:20 p.m. EST Tornado Warning, the radio station personnel stated they had heard that the tornado had hit Conyers and Walnut Grove and believed it possibly was north of Monroe at that time; but they had gone outside and could not see it. Reportedly, power went out in Monroe shortly after this time. The 6:35 p.m. EST Tornado Warning was given to Athens radio stations between 6:40 and 6:48 p.m. EST, and a little earlier on NWWS. The warning preceded the tornado at Athens by approximately 20 minutes.

At 7:20 p.m. EST, WSO, Athens issued a Tornado Warning continued for Madison County and extended farther downstream to the counties of Elbert, Hart, and Franklin after learning from the radio stations then without power and from the Police Department via NAWAS of the path across the northern portion of Athens. At 7:35 p.m. EST a Tornado Warning was issued for Walton, Morgan, Oconee, Clarke and Oglethorpe counties based on a possible hook echo detected 25 miles southwest of Athens when radar operation was restored at 7:26 p.m.EST since going off at 6:58 p.m. EST.

The warnings issued by WSFO, Atlanta and WSO, Athens were issued in a timely fashion and were received by persons viewing or listening to the radio and television stations on which they were transmitted. Timely receipt of reports about the damage at Jonesboro and excellent means of rapidly disseminating the warnings from WSFO, Atlanta by VHF/FM, NOAA Weather Wire Service,

NAWAS, to radio and television stations, wire services, and others along with the fast decisive action by the WSFO, Atlanta personnel maximized the effectiveness of the Severe Weather Statement, Severe Thunderstorm Warning, and Tornado Warning and other releases for the Atlanta Metropolitan Area and downstream areas as far as Conyers, in Rockdale County, where the greatest amount of property damage occurred.

Warnings issued for the Athens area were made possible primarily by the expert interpretation of radar intelligence and decisive action in using it by the WSO, Athens personnel. More frequent and more specific warnings and greater lead time would have been likely if WSO, Athens had received more timely reports of tornado damage upstream. The warnings for the Athens area were timely prepared, and they were quickly disseminated over the radio stations in Athens. Receipt of the warnings by the public were restricted to a considerable extent, however, because Athens has TV only by cable. All the channels come from outside Athens, and most of them do not broadcast severe weather warnings for Athens.

There were no severe weather watches issued during the Georgia tornado event.

CHAPTER III. Preparedness Actions

Part A. Georgia

The Atlanta WSFO and Athens WSO provided leadership or otherwise played a significant role in the following preparedness actions in 1973 to heighten community advance preparedness and to enhance severe weather procedures.

1. Atlanta WSFO

   a. Spotter Training to State Trooper In-Service classes at the Georgia Police Academy in Atlanta, Georgia on the following dates:

      January 2, 1973
      February 15, 1973
      February 19, 1973
      February 26, 1973
      March 6, 1973
      March 19, 1973

      The size of the classes ranged from approximately 40 to 60 students from all over Georgia. Additional classes are scheduled through June.

   b. Spotter Training and Other Preparedness for the Defense Civil Preparedness Agency.

      February 1, 1973 - Atlanta, Georgia
      February 15, 1973 - Thomaston, Georgia
      March 22, 1973 - Cartersville, Georgia

   c. Drills on Severe Weather Procedures on March 21, 1973 to eighteen office personnel

2. Athens WSO

   a. Spotter Training and Other Preparedness Activity - Conducted at Northeast Georgia Preparedness Meeting for Defense Civil Preparedness Agency and Law Enforcement Agencies on March 20, 1973.

   b. Simulated Tornado Warning Drill conducted with offices of Jackson County and Madison County Defense Civil Preparedness Agency on March 30, 1973 - the day before the Jonesboro-Athens tornado.

CHAPTER IV. Public Dissemination

Part A. Georgia

WSFO, Atlanta has NOAA Weather Wire Service (NWWS), VHF/FM direct broadcast facility, a microphone to make direct broadcasts on Radio and TV Station WSB, and telephones on which to distribute forecasts and warnings to the public. Additional communication facilities are NAWAS and RAWARC. WSFO, Atlanta is the State Relay Center (SRC) for the Georgia NWWS and therefore also has the NWWS Overlay Circuit. These facilities were utilized in a most exemplary and effective manner - systematically and expeditiously - to distribute severe weather warnings on the day of the tornadoes. By using the three-manifold standard severe weather forms and by systematically assigning different personnel to the various warning functions, the Atlanta WSFO distributed the 5:35 p.m. EST Tornado Warning nearly simultaneously on all warning facilities - NAWAS 5:29 p.m. EST, direct broadcast to WSB at 5:30 p.m. EST, VHF-FM 5:32 p.m. EST, NWWS 5:36 p.m. EST, and RAWARC at 5:40 p.m. EST. WSB is the Emergency Broadcast System (EBS) station and was requested at least twice to use the Emergency Action Notification Signal (EANS). It was learned later that EANS was not used and the reason is not known.

There are four radio and TV stations in Atlanta on NWWS. Seven direct line WSB broadcasts were made from the Atlanta WSFO between 5:30 and 9:30 p.m. EST., five or six of them while the tornado was occurring. Both UPI and AP are also on NWWS, and they recut and retransmitted the tornado warning at 5:40 p.m. EST. Altogether there are eighteen NWWS subscribers in addition to NWS in Atlanta, including the Georgia Department of Civil Defense which retransmits warnings to the State Police, the American Red Cross - Disaster Service Department, various utility companies, and others.

A telephone survey of 45 radio and television stations in the Atlanta area was taken by WSFO, Atlanta a few days after the tornado. Only 26 stations could answer whether the Tornado Warning was disseminated, some of the reasons given were that inexperienced weekend personnel were on duty. Twenty-four (24) of the stations stated they broadcast the warning, 18 by 5:45 p.m. EST. Seven (7) of them received the warning by NWWS, but there were only 4 separate receptions since radio and TV are collocated at some places. AP and UPI also received the warning by NWWS. Fifteen (15) stations received the warning from UPI and AP at 5:45 p.m. EST. Two stations received the warning by VHF-FM. Twelve (12) of the 26 stations have capability of receiving the warning by VHF, but only two of them have tone alert feature, and only one of them worked for the Tornado Warning. Several stations received the warning both by VHF-FM and the wire services. Several of the stations were unaware of the VHF-FM system and expressed interest in it. Most of the stations praised the warning, expressing surprise that it came out so quickly after the Jonesboro tornado occurrence.

WSO, Athens is on NWWS, but there are no subscribers in Athens. The only subscriber in the Athens WSO county warning area is Radio Station WCON in Cornelia, Habersham County, 40 miles north of Athens. The releases issued by WSO, Athens, however, do go to the press services, State DCPA, and radio and television stations in Atlanta by means of NWWS. Radio Station WRME in Monroe was telephoned the 6:20 p.m. EST Tornado Warning for Morgan and Walton (Monroe) counties at 6:30 p.m. EST. There was difficulty and delay in reaching WRME and was accomplished only with the help of the emergency operator, "Inwood Operator" at Winder, Georgia. Station WRME also received the warning on the AP wire.

At 6:25 p.m. EST the Barrow County Sheriff and Radio Station WIMO at Winder in Barrow County were telephoned the 6:20 p.m. EST Tornado Warning for Morgan and Walton counties. Walton County adjoins Barrow County to the southwest. There are three radio stations in Athens - WRFC, WGAU, and WDOL. All three of the stations were telephoned and received the 6:00 p.m. EST Severe Thunderstorm Warning between 6:00 and 6:10 p.m. EST. The 6:35 p.m. EST Tornado Warning was telephoned to all three stations between 6:40 and 6:48 p.m. EST, but WDOL did not answer, and it was learned later that the one man on duty there was reading and broadcasting tornado safety rules. Both WRFC and WGAU taped the warning and it was broadcast by both stations more than once, beginning at 6:42 p.m. EST by WGAU. The Athens WSO has a microphone in its office on which to make tapes or direct broadcasts on WGAU, but telephone contact is necessary to make sure that the broadcast is being received, although turning on a transformer in the WSO will turn on a light at WGAU. This system was not used since the warnings were given and taped for broadcast when WGAU was telephoned. WSAU is both AM and FM, and normally the AM goes off at 6:45 p.m. EST, but both were on during the tornado event. WRFC AM and WDOL FM are both 24-hour stations. All of the stations were knocked off the air about 6:58 p.m. EST when they lost power. They are without emergency power.

There are no local TV stations in Athens. The populace receives TV primarily by cable from station in Atlanta, Georgia and in Greenville and Spartanburg, South Carolina. A station in Asheville, North Carolina can also be received. Most of these stations do not carry forecasts nor warnings issued by WSO, Athens. One person did state, however, that the warning was carried on TV Channel 2, WSB, from Atlanta shortly before the power went off. Static on radio, both AM and FM, and on TV stations not on cable was great during the storm.

All of the warnings issued by WSO, Athens were transmitted on NAWAS which goes to the local police station in Athens where DCPA also receives the warnings and to the State DCPA in Atlanta. At 6:55 p.m. or earlier the 6:35 p.m. EST Tornado Warning was called to the DCPA Director of Madison County, which adjoins Clarke County (contains Athens) to the northeast.

THE VOICE OF ATHENS SINCE 1938

wgau

549-1240 P. O. BOX 5099 30604

athens, geor

April 4, 1973

NOAA - National Weather Service
Southern Regional Headquarters
819 Taylor Street - Room 10E09
Fort Worth, Texas 76102

ATTN: Mr. Harold McCrabb

Dear Mr. McCrabb:

Re the tornado which struck Georgia and the Athens-Area last Saturday, March 31, 1973. I called your weather station for your name and address, so that I could properly thank you for the service to the community which our stations: W G A U and W N G C - FM were able to render our community, thus saving many lives in the area.

We were impressed with the service your weather personnel rendered during this emergency and the way they handled this very serious matter. In fact, they had even carried out a dry run for a storm warning the preceding day! Here are the facts on the Athens' storm. We broadcast a warning at 6:42 PM, and had time to broadcast a second warning when your men told us that the tornado was at the North and West edge of town. As our announcer was talking to him, the power went off as the storm hit. However, this second warning was heard by hundreds of persons who took immediate cover. Many people told me, as I toured the devastated area with Governor Carter the next day, that they had heard our warnings, had covered themselves with blankets and clothing, got under tables or sofas in their mobile homes, or into center halls or basements in regular houses.

We are connected to your office with a direct line. When your personnel turn on the transformer there, it lights a light on our studio board, and we can be in direct contact in less than 10 seconds. We are now going to extend our mike cord so that the microphone can be extended into your radar room when necessary, as suggested by Mr. Cleve Halladay in a conference yesterday and today. We have received hundreds of personal letters, phone calls and face to face expressions of thanks for our services which can in great part be passed along to the weather service for their work in keeping us abreast of the storm conditions.

Your people did a fine job, and many lives were saved as a result.

Cordially,

H. Randolph Holder
President

HRH/c1bh

ESSA WEATHER WIRE SERVICE

GEORGIA

MND & OTHER USERS

CORRECTED THRU 02-26-73

Albany 40 GT 25-29

WALB - TV Sta

Atlanta 40 GT 25-1

WAGA-TV
U.S. Army Eng. S. Atlantic Div.
WQXI - TV Station
UPI - News
Atl. City of Water Dept., 10th St.
Georgia Dept. of Civil Defense
Georgia Power Company
American Red Cross-Disaster Svc. Dept.
Associated Press
Atlanta Gas Light Company
WPLO
S. B. T. & T. Co. - Traffic Unit
WSB - TV News and WSB Radio News
Georgia Motor Club
Atlanta City of Water Dept., Ridgeview Rd.
S. B. T. & T. Co. - Plant Maintenance
U. S. Geological
Fernbank Science Center

Augusta 40 GT 25-8

WGAC

Claxton 40 GT 25-10

WCLA

Columbus 40 GT 25-5

WTVM - TV

Cornelia 40 GT 25-39

WCON

Glennville 40 GT 25-63

WKIG

Macon 40 GT 25-6

WMAZ - Radio
WMAZ - TV
Macon Cable - TV

Rome 40 GT 25-2

WRGA

Savannah 40 GT 25-13

Savannah Power & Light Co.
Brady's Boat Works
Savannah Gas Company
U. S. Corps of Engineers
WTOC
WEAS
WSAV
WZAT - Radio

Thomasville 40 GT 25-33

South Georgia Gas Company
WCTV - TV Station

GEORGIA SCHEDULE - NOAA WEATHER WIRE
Effective October 29, 1972

AM EST	
2:40	Fallout Winds Forecast
4:30	National Weather Summary and Additional Details for the 7 Southeastern States
4:40	Georgia Weather Summary
5:05	Forecasts: Georgia Zones - Local Forecast Atlanta and Rome - Georgia State
5:20	Agricultural Forecasts: South Carolina
5:28	Local Forecasts: Augusta, Macon, Savannah, Athens, Columbus
5:40	Extended Outlook: Georgia, North and South Carolina, Florida, Alabama and NW Florida, Tennessee
5:50	State Forecasts: North Carolina, South Carolina, Cape Fear to Savannah, Florida, Savannah to Cape Kennedy, Alabama, Northwest Florida
6:05	State Forecasts: Virginia, Kentucky, Tennessee, Arkansas, Mississippi, Louisiana. . .If available. . .West Virginia, Delaware, Maryland
6:15	Agricultural Forecasts: SE & SW Georgia, SE Alabama, North Florida
6:25	Weather Roundup
6:30	Agricultural Dust and Spray Forecast
6:35	Tennessee State & Zone Forecasts (Sunday only)
6:40	State Forecasts continued (as needed)
7:05	Georgia Lake Wind Forecasts
7:20	Weather Roundup
7:27	Local Climat Data: Atlanta, Athens, Augusta, Macon, Savannah, Rome Columbus
7:35	Cotton Harvest Forecast (Seasonal)
7:37	Georgia Temperature and Precipitation Table
7:50	Columbus River Stage
8:09	Special Wind Forecast Growers or Vegetative Wetting Report and Forecast (Seasonal) and Agricultural Specials
8:15	Selected Cities Weather Summary
9:20	Agricultural Weather Reports (Mon-Fri) (ATL)
9:30	National Weather Summary
9:40	Georgia Agricultural Weather Reports (EXP, SAV, TIF, MCN)

AM EST

10:10 N. Carolina - Virginia Ski Slope Summary
10:15 Georgia Agriculture Operational Weather Information
10:20 Weather Roundup
10:30 Additional Details for the 7 Southeastern States
10:40 Georgia River Stages and Forecasts

11:00 Georgia Weather Summary
11:05 Alabama and Florida Agriculture Operational Weather Information
11:14 Forecasts: Georgia Zones - Local Forecast Atlanta and Rome
11:26 Weather Roundup
11:30 Local Forecasts: Augusta, Columbia, Macon, Savannah, Athens
11:50 Tropical Weather Outlook (June to November)
11:54 Local Forecast: Tallahassee

PM EST

12:15 Updated Agricultural Forecasts: SE & SW Georgia, SE Alabama, Northern Florida (if needed)
12:50 National Temperature Roundup

1:00 Updated Agricultural Forecasts - South Carolina (if needed)
1:25 Tide Data for Florida
1:35 Special Agricultural Information - Market News

2:40 Shade Tobacco Growers Plant Bed Forecast (Seasonal)

3:00 Fulton County Air Pollution Index
3:10 National Weather Summary
3:20 Fallout Winds Forecast
3:40 Georgia Agriculture Operational Weather Information - Haying Advisories (as available)
3:50 30-Day Agricultural Weather Outlook (twice monthly)

4:10 Weekly Weather and Crop Report - Georgia (Monday)
4:20 Weather Roundup
4:30 Additional Details for the 7 Southeastern States
4:50 Agricultural Forecasts - South Carolina

5:00 Climat Data - Atlanta
5:05 Forecasts: Georgia Zones - Local Forecast Atlanta - Georgia State
5:15 Climat Data: Athens, Augusta, Columbus, Savannah, Macon
5:20 Georgia Weather Summary
5:25 Weather Roundup
5:28 Local Forecasts: Augusta, Columbus, Macon, Savannah, Athens
5:50 Tropical Weather Outlook (June to November)

PM EST

6:06 State Forecasts: North Carolina, South Carolina, Cape Fear to Savannah, Florida, Savannah to Cape Kennedy, Alabama, Northwest Florida, Virginia, Kentucky, Tennessee, Arkansas, Mississippi, Louisiana . . . If available . . . West Virginia, Delaware, Maryland (finish states after TLH Agricultural Forecast)
6:25 Agricultural Forecasts: SE & SW Georgia, SE Alabama, Northern Florida
6:38 National Temperature Roundup
6:42 Extended Outlook - Georgia, Florida, Alabama, Tennessee, North and South Carolina

7:01 Agricultural Dust and Spray Forecast
7:30 Area Temperature and Precipitation Table

8:15 Selected Cities Weather Summary

9:30 National Weather Summary and Additional Details for the 7 Southeastern States

10:05 Georgia Weather Summary
10:10 Updated Georgia Zone Forecasts (if needed)
10:18 Weather Roundup
10:30 Updated Local Forecasts: Atlanta, Rome, Augusta, Macon, Savannah, Athens (if needed)
10:40 National Temperature Roundup

Each hour Georgia Stations will send Surface Observations 45 thru 50.

Each hour Athens, Waycross, and Apalachicola radar will be sent 50 thru 59 except 00 thru 04 when other traffic scheduled for the 50 thru 59 period.

NAWAS - Georgia

Law Enforcement Warning Points

Albany - PD, Marine Corps Supply Depot
Athens - PD, NWS, SO
*Atlanta - SP, PD, NWS, Ft. McPhearson, Federal Penitentiary with fan-out to government agencies

Augusta PD,	- NWS
Brunswick	- PD
Columbus	- PD
Dalton	- PD
Decatur	- PD
Douglas	- PD
Dublin	- SP
Gainesville	- PD
Griffin	- PD
LaGrange	- PD
Macon	- PD
Milledgeville	- PD
#Thomasville	- DCPA
Toccoa	- PD
Savannah	- PD
Valdosta	- PD
Waycross	- PD

Legend:
* - State Warning Center
# - DCPA Regional Office
PD - Police Department
FD - Fire Department
SP - State Police
DCPA - Defense Civil Preparedness Agency
SO - Sheriff's Office

NAWAS - Georgia

NWS (Intrastate):

WSO, Athens
WSFO, Atlanta
WSO, Augusta
WSO, Columbus
WSO, Macon
WSO, Savannah
WSMO, Waycross

NWS (Interstate):

WSO, Augusta (SC)
WSO, Columbus (Ala.)
WSO, Waycross (Fla.)

CHAPTER V. User Response and Service Benefits

Two million people were within 25 miles of the tornadoes that struck Georgia and South Carolina the evening of March 31, 1973. Of these, a huge majority started their day with a radio or TV broadcast of approaching thunderstorms along with their breakfast coffee. The tempo quickened steadily for those tuned to broadcast media. The noon NWS Georgia Weather Summary headlined "OUT LIKE A LION," March would end with wind and thunder. Thus, very few were surprised when clouds darkened the afternoon, thunder ushered in the evening, and a warning announced the tornado occurrence at 5:35 p.m. EST. This is the process of sensitization, an accepted tenant of storm warning theory whereby people gradually increase storm vigilance and are able to mount a positive response if needed.

Public response to a major storm event, its warning and its actual occurrence, is a many faceted affair. Increased short term sensitization just before the storm promotes positive response. Long term sensitization, a result of personal experience with storms or storm preparedness education, also leads to positive response.

Short term sensitization -- reception of forecasts, warnings and out-the-window visible signs -- is a function of warning service effectiveness and individual alertness. Long term sensitization -- experience and storm education -- is a function of social culture and exposure to storm preparedness programs. These four factors varied greatly with individuals along the storm path. South Atlanta and north Athens contain sophisticated suburban areas populated by many new residents from distant states while in the rural areas most are long time residents who are oriented more towards local events and occurrences.

Amazingly, the sum of these variations led to a collective response that resulted in a high rate of personal survival despite immense property loss and personal injury. Only eight persons lost their lives while 350 were injured, 2000 homes were lost and two to three thousand people lost their jobs and place of business.

Interviews with DCPA, press and police officials, and with individuals on the storm track suggest that only half of the people heard specific warnings but nearly all were well aware, in a general fashion, that severe weather was in the offing. A large number of people took some last second evasive action; got under tables or beds or laid on the floor. A few took more planned action: opened windows in accordance with storm warning rules or secured loose objects outside of buildings.

Part A. Response in Georgia

User Response

Survey interviews suggest that about half of the population heard tornado warnings broadcast by radio and television. A greater percent of the population in and near Atlanta acknowledged hearing specific warnings than in other areas. One of the well known sports programs was showing at the time of the first tornado warning and many people said they saw the warning by moving words at the bottom of the tube during this particular program. Ohters received the warnings by radio or other Atlanta television stations. Others

In Athens many heard direct broadcasts from WSO Athens on local radio stations. Some received warnings from Atlanta stations. Athens has no television stations but receives broadcasts from several other areas; signals from distant cities are piped into many local receivers by cable. It is quite possible to be tuned to radio or TV, a distant station, and still miss warnings -- some did. Added to this, static made reception very difficult in Athens because of intense electrical activity accompanying the tornado.

Georgia DCPA and NW offices have devoted a lot of effort to preparedness programs and a very high percent of the population seemed aware of tornado safety precautions. The public educational effort concerning mobile home tie downs has been less successful than other efforts, probably because it costs money to follow this recommendation. Georgia had nearly 70,000 mobile homes according to the 1970 census but DCPA estimates that over 95 percent are not tied down. This is despite the distribution program that put thousands of booklets describing how to tie down trailers into the hands of individual owners and mobile park operators. Several hundred mobile homes were destroyed by the storm.

Following almost every storm disaster, storm surveyers hear the remark "I don't see how so many people survived." And because of the predictability of this common remark, surveyers tend to ignore it, but not so this time. Absolute destruction in many areas made escape an amazing feat.

Major General Noel B. Paris III, in charge of Georgia DCPA, received a great deal of on-sight interview information. He indicated that most people took some sort of last second evasive action and this was responsible for keeping fatalities to the surprising low level. General Paris concluded that two factors lead to this response: prior distribution of storm warning literature and timely airing of storm warnings and reports by broadcast stations.

A small portion of the population moved or secured objects that were outside of buildings and might blow away by the wind. Because of the season and because of earlier thunderstorms, very few made this response. Some residents, probably less than 10 percent, opened a window to reduce the pressure differential caused by tornadoes and this was reported to be effective in a few cases. The response of the great majority of the population was to try to get cover for themselves and their families. Many recognized the loud roar of the tornado and got under tables, beds or other protective furniture. Some just dropped to the floor. A few reported that they had time enough to pull mattresses over themselves and their families. Even in untied mobile homes, many saved their lives in these manners despite destruction of their surroundings.

Evaluation of Service Benefits

There is no objective method of telling how effective the tornado warning system operated on the night of this storm; no way to say how many lives would have been lost if there had been no warning system. But a comparison with earlier storms gives a gross estimate.

Twenty years ago a tornado hit Warner Robins, Georgia and 23 persons lost their lives. That storm did not produce as much property destruction but caused many more fatalities. In 1936, a tornado struck Gainesville, Georgia and caused more than 200 deaths. This is another case where an earlier storm did not create near as much property damage but caused far more casualties. The only logical conclusion is that the current warning system must have reduced potential loss of life.

The Atlanta Constitution of April 3, 1973 focused on this problem in their lead editorial (see next page). Their analysis indicated that advances in weather technology and mass media communications made the difference between this storm and storms 20 to 30 years earlier when fatalities were so much higher.

THE ATLANTA CONSTITUTION

For 104 Years the South's Standard Newspaper

JACK TARVER, President **REG MURPHY, Editor**

PAGE 4-A, TUESDAY, APRIL 3, 1973

The Storm

Gov. Jimmy Carter called it "probably the worst natural disaster in terms of property damage ever suffered by the state." It wasn't quite.

The death of two Georgians in the tornado that slammed the northeastern part of the state Saturday was a tragedy for the victims and their families. But considering the devastating power of the storm that left hundreds injured, 5,000 homeless and caused an estimated $100 million in property damage, the death toll was remarkably low.

The governor wasted no time in going out personally to survey the damage and said the worst-hit sections will be declared disaster areas which will allow victims to receive various kinds of federal aid. From the governor on down, state and local officials and law enforcement officers acquitted themselves well in this emergency. State agencies quickly opened and manned relief centers.

We would hope the federal government will speed aid to the stricken areas.

Bad as the weekend storm was, it approached neither the 1936 Gainesville storm nor a 1953 twister in Warner Robins for ferocity, property damage, or death. Gainesville lost the entire center of the city, as well as more than 200 lives. Warner Robins recorded 23 dead in a storm which demolished much of Macon as well.

One great advantage people today have over those of a few decades ago is the advance in scientific weather forecasting techniques. That combined with the communication of tornado warnings over radio, television and in the newspapers. People forewarned can do nothing to prevent the storm from coming, but they can prepare for the worst and be ready. The worst tornado in history roared across Missouri, Illinois and Indiana in March, 1925, and killed 689 people. Hopefully that frightful a toll of lives is very unlikely today.

APPENDIX A1

Personnel on Duty - Georgia

1. WSFO, Atlanta

   (a) David P. Barnes, PA - GS-14
   (b) William R. Conyers, Leading Forecaster - GS-13
   (c) Robert C. Mangan, Leading Forecaster - GS-13
   (d) Harvey M. Hostetter, WSS - GS-10
   (e) Brian E. Peters, Met. Intern - GS-9
   (f) Douglas H. Davis, Forecaster Aide - GS-5

2. WSO, Athens

   (a) G. C. Holliday, MIC - GS-13
   (b) B. J. Smith, PA - GS-12
   (c) Charles R. Hancock, Jr., WSS and Radar - GS-11
   (d) Ed C. Higdon, WSS and Radar - GS-11
   (e) Edward N. Chandler, Obs Spec - GS-8

The MIC and PA were extra personnel who reported to duty at 5:30 and 6:00 p.m. EST, respectively. Mr. Randall R. Elms, Electronics Specialist - GS-11 and Mr. Douglas G. Tyree, Observations Specialist - GS-8 began duty at 7:30 and 8:00 p.m. EST, respectively.

APPENDIX A2

Radar - Georgia

Radar played an important role in the tornado events of March 31, 1973 in Georgia and South Carolina. Tracks for both of these tornadoes were within 60 nautical miles of the Athens WSR-57 Radar. Between 3:36 and 11:40 p.m. EST, WSO, Athens recorded and sent 24 special radar observations. A hook was detected at 6:15 p.m. EST a few miles west of Monroe, Louisiana, AZRAN 286/6, and followed for about 43 minutes nearly all the way to Athens at 6:58 p.m. EST, AZRAN 286/6, when the hook was obliterated by normal ground clutter as a momentary power failure interrupted the radar. There was no hook visible at 7:26 p.m. EST when the radar was back on. However, a supposed hook in a new location 25 w of Athens was noted; but within 5 minutes it did not appear to be a hook. There were no hooks detected after this time prior to and during the tornado in South Carolina. During both of these tornadoes, however, echo intensities were strong or very strong; tops exceeded the tropopause by several thousand feet; and echo movements generally ranged between 40 and 50 knots - all indicators of potentially severe storms. After the first report of the tornado at Jonesboro, Georgia, the primary basis for the issuance of warnings by WSFO, Atlanta, was radar indications.

One of the first actions of WSFO, Atlanta when they received the report of a tornado at Jonesboro was to look at their local use WSR-3 Radar and relate the tornado report to an apparent "severe" cell and use this information in immediately issuing the 5:35 p.m. EST Tornado Warning for downstream counties. The local radar was used in a similar fashion by the Atlanta WSFO, when Athens WSO radar called on the WBRR hotline about thunderstorm activity, in issuing the 4:40 p.m. EST Severe Weather Statement and again for the Severe Thunderstorm Warnings of 5:00 and 5:25 p.m. EST.

Both WSFO, Atlanta and WSO, Greenville received facsimile radarscope displays from the Athens WSR-57 Radar by the Weather Bureau Radar Remote (WBRR) system which is annotated at Athens by the Data Insertion Device (DID). This system was in use except for the period from 6:58 p.m. to 7:26 p.m. EST when radar reception was interrupted because of power failure. Attachments include 3M copies of photographs from the films of the Athens radarscope and 3M copies of the WBRR facsimile copy received at WSFO, ATlanta for similar time periods. The difference in quality is marked.

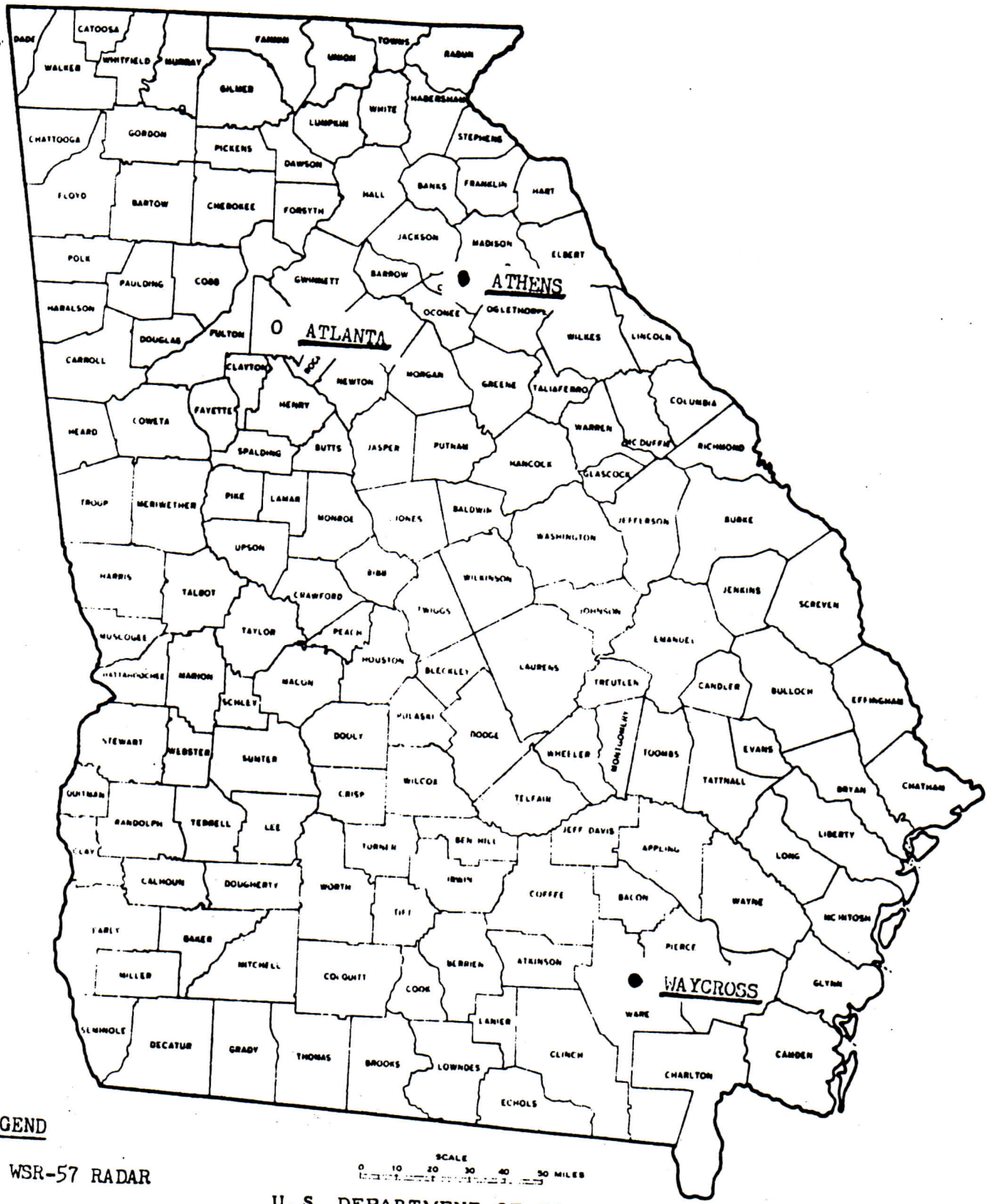
The voice communication accompanying the WBRR system, the hotline, continued in operation from WSO, Athens to WSFO, Atlanta and WSO, Greenville without interruption and was used frequently. Communication on this hotline between WSO, Athens and WSFO, Atlanta was several times an hour after 4:30 p.m. EST and between WSO, Athens and WSO, Greenville was at least twice an hour between 7:00 and 10:00 p.m. EST. Between 8:45 and 9:00 p.m. EST a hotline

call was made from WSO, Athens to WSO, Greenville who indicated a Severe Thunderstorm Warning was already in the process of being issued. The Atlanta WSFO feels the greatest benefit of the WBRR system is the accompanying hotline.

The Athens WSR-57 radar lost power at 6:58 p.m. because of a blown fuse, probably because of a power surge. Another fuse was blown after switching to emergency power. Mr. Charles Hancock, WSS and Radar Specialist, changed the fuses; and short-pulse was back on at 7:26 p.m. EST and long-pulse between 7:30 and 7:40 p.m. EST. Normally, a switch to emergency power is made when severe weather is anticipated, but a decision was made to continue on commercial power after the tornado report at Jonesboro and the radar indications at that time so that important radar intelligence would not be interrupted by a change to emergency power. The outage of the radar for about one-half hour beginning at 6:58 p.m. EST is not considered as appreciably affecting the warning process during this time. The Video Integrator and Processor (VIP) system is not presently available on the Athens WSR-57 Radar.

WEATHER RADAR NETWORK

GEORGIA



U. S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS
Corrected as of April 1965

MF 7-80
(10-69)
(FORMERLY WBAN FORM 60)

RADAR WEATHER OBSERVATIONS

U.S. DEPARTMENT OF COMMERCE
ENVIRONMENTAL SCIENCE SERVICE ADMINISTRATION
WEATHER BUREAU

PAGE 27

STATION: ATHENS, GA.
TYPE OF RADAR: WSR-57M(10CM)
CALIBRATION DATUM: LB, 34/TF 4.95
CALIBRATION DATUM:
DATE - TIME: 3/27/1700
DATE - TIME:
FILM ROLL: 73-5 ON
DATE - TIME: 3/28/2145
COUNTER: UC/4
FILM ROLL: ON
DATE - TIME:
COUNTER:
DATE - TIME: OFF
COUNTER:
DATE - TIME: OFF
COUNTER:
CAMERA/MAGAZINE NOS.: 53-6851/53-6852
CAMERA/MAGAZINE NOS.:
f: 56
MONTH: MARCH
YEAR: 1973
DATE - TIME: 34/1830
DATE - TIME: TO 1-0240

DATE	TIME (GMT)	DESCRIPTION OF ECHO: CHARACTER, TYPE, INTENSITY	TREND	5A DIRECTION	5A DISTANCE	5B DIRECTION	5B DISTANCE	5C DIRECTION	5C DISTANCE	5D DIRECTION	5D DISTANCE	5E DIRECTION	5E DISTANCE	WIDTH, DIAMETER	MOVEMENT: SYSTEM	MOVEMENT: CELLS, ELEMENTS	MAX. TOP 100's ft. MSL	REMARKS, WEATHER NOTES, OPERATIONAL STATUS, PHOTOGRAPHIC DATA, ETC.	INITIALS
1	2	3	4	5A		5B		5C		5D		5E		6	7	8	9	POWER COR. UP 0 SP 0 (10)	11
01	2330	AREA 1 TRW/NC		34/100		90/95		208/90		232/125		316/80				2440	330	304/35 320 255/70 300 285/40 33/35	
2	2338	CELL TRW+/NC		258/65												2445	460	TRAP 420	
		AREA 4 TRW/NC		6/75		66/140		253/160		305/75				D20		2445	370	at 296/55	
3	2346	LN S TRW+/NC		330/60		261/35		236/130						15W		2445	480	at 304/36 460 ~~at 246/55~~ 420 at 237/115 TRAP 430	
4	2350	CELL TRW+/NC		204/70										N22		2445	520	TORNADO RPTD IN DOERUN BORO, GA	
		CELLS															460	~~at 252/43~~	
5	2350	CELLS TRW+/NC		332/95		D/14		TRAP 520		241/60		D/16		TRAP	520	34	3/40	D15 TRAP 430 CELLS 2348 TRAP 420	
		AREA 6 TRW/NC		351/70		62/35		334/162								2445	360	~~at 35~~ 62/35	
		AREA 2 RW/NC		45/30		77/115										2335	230		
6	2330	CELLS TRW+/NC		332/84		D/12		TRAP 540		337/87		D/18		TRAP	490	35	1/25	D16 TRAP 430 5/55 D16 TRAP 420 CELLS 2440 TRAP TRAP 42	
7	2345	HOOK		248/26												2440			
8	2350	HOOK		249/23															
9	2335	HOOK		356/17												2445	500	at 238/20	
10	2355	CELLS TRW+/NC		332/24		D/12		TRAP 500		238/66		D/14		TRAP	238/67	356/40 D14 TRAP 460 TRAP 420			
		AREA 5 TRW+/NC		45/85		258/35								5CW		2445	430	at 31/70	
11	2355	HOOK		356/6												2445		Penn Yan Lee 2358 (S.P 0026)	
12	0000	AREA 4 TRW-/NC		355/80		58/150		193/70		232/140						2445	490	at 49/46	
		HOOK		238/64															
		CELL TRW++/+		330/82										D20		2445	550	TRAP 420	
		CELL TRW+/NC		29/60										D18		2445	470	TRAP 420	
0007		HOOK		218/27												2445			
0012		HOOK		207/18												2445			
		LN S TRW+/NC		358/85		58/92		212/25						14W		2445	450	at 76/18	
		LN S TRW+/NC		234/48		238/107								14W			530	at 238/60 520 at 279/100 TRAP 420	
0140		LN S TRW+/NC		56/125		228/100								14W		2045	530	at 224/52 530 at 58/50 TRAP 420	
		AREA 4 TRW+/NC		55/140		225/100								110W		2445	430	at 101/35 INCLS LN TRAP 420	
		AREA 3 TRW+/-		222/120		205/165		265/200		222/180						2445			
0212		CELL TRW+/NC		178/30										D22		2445	530	TRAP 420	
		CELL TRW++/NC		86/25										D24		2445	530	TRAP 420	
		CELL TRW+/NC		62/77										D26		2445	520	TRAP 420	
0240		CELL TRW++/NC		150/32		D/24		TRAP 510		238/104		D/14		TRAP	460	68	1/40	D16 TRAP 520 30/24 D16 TRAP 420 CELLS 2440 TRAP 42	
		LN S TRW+/NC		57/165		61/115		84/68								2440	510	at 68/100 TRAP 510	
		AREA 5 TRW+/NC		56/167		100/91		222/70		19/80						2440	510	at 94/82	

(10-69)
(FORMERLY WBAN FORM 60)

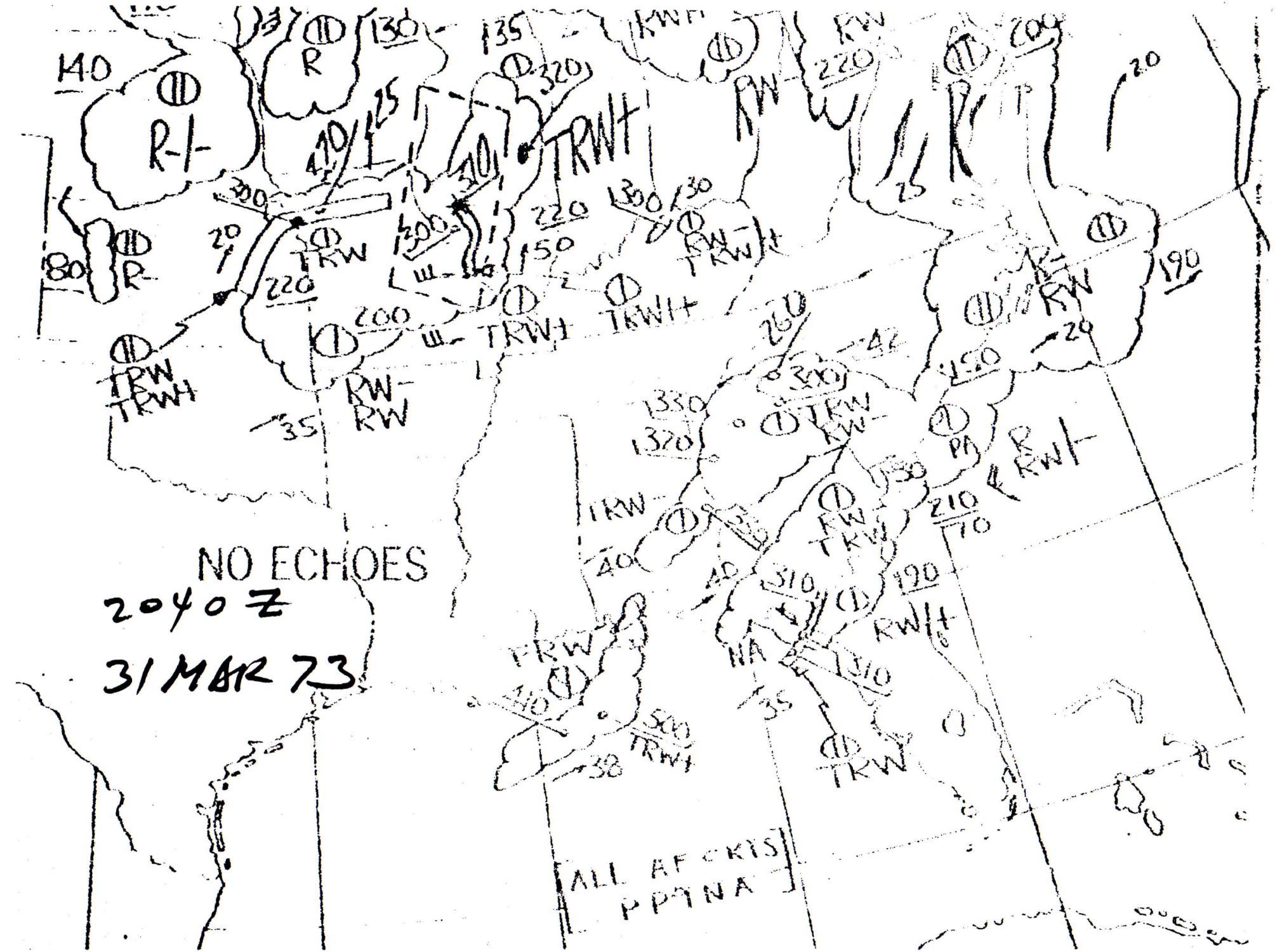
RADAR WEATHER OBSERVATIONS

ENVIRONMENTAL SCIENCE SE... ...S ADMINISTRATION
WEATHER BUREAU

STATION	CALIBRATION DATUM	DATE - TIME	FILM ROLL	DATE - TIME	COUNTER	DATE - TIME	COUNTER	CAMERA/MAGAZINE NOS.	f	MONTH	YEAR
ATHENS, GA.	L6.34/EF 4.95	3/27/1700	73-5 ON	3/27/2145	4914	OFF		53-6881/53-6807	5.6	MARCH	19[illegible]
TYPE OF RADAR	CALIBRATION DATUM	DATE - TIME	FILM ROLL	DATE - TIME	COUNTER	DATE - TIME	COUNTER	CAMERA/MAGAZINE NOS.	DATE - TIME		DATE
WSR-57M(10CM)			ON			OFF			1/0240 TO		1/234

DATE	TIME (GMT)	DESCRIPTION OF ECHO: CHARACTER, TYPE, INTENSITY	TREND	DIRECTION 5A	DISTANCE 5A	DIRECTION 5B	DISTANCE 5B	DIRECTION 5C	DISTANCE 5C	DIRECTION 5D	DISTANCE 5D	DIRECTION 5E	DISTANCE 5E	WIDTH-DIAMETER 6	MOVEMENT: SYSTEM 7	MOVEMENT: CELLS, ELEMENTS 8	MAX. TOP 100's ft. MSL 9	REMARKS, WEATHER NOTES, OPERATIONAL STATUS, PHOTOGRAPHIC DATA, ETC.
																		POWER COR. LP ... SP ...
1	0314	CELL TRW++/NC		115/30										D30		2540	525	TRop 420
	✓	CELL TRW++/NC		68/55										D24		2540	550	
	✓	CELL TRW+/NC		23/85										D16		2540	440	
				~~25/85~~														
P2	0338	AREA 5 TRW+/NC		49/201	68/186	174/164	220/131	337 35								2540	520	AT 98/40 500 69/109
SPL	0411	CELLS TRW+/NC		28/72	D10 TOP 450		74/74	D12						TOP 470		91/62		D12 TOP 600 ALL CELLS 2545
P2	0440	LN 10 TRW+/NC		165/119	88/69	135/60								10W		2540	520	AT 93/71
		AREA 6 TRW+/NC		20/110	69/181	160/201	202/132									2540	520	AT 93/71
SPL	0516	CELLS TRW+/NC		76/48	D10	TOP 440		84/85	D10	TOP 520						2540		
SPL	0540	LN TRW/NEW		4/41	258/41	274/96								10W			350	AT 248/56
		AREA TRW+/NC		359/116	66/182	156/279	221/186									2540	480	AT 71/113 420 AT 83/105 MOSTLY TRW
SPL	0615	CELLS TRW+/NC		65/87	D10	TOP 350	341/346	D8	360	248/35	D10							310 A RPT THIS CELL ALL CELLS 2540
SPL	0640	LN 7 TRW/NC		15/69	318/23	239/41								12W	2720	2540	300	284/18
		LN 10 TRW/NC		164/106	181/114	191/135										2540	350	164/106
		AREA 4 TRW/NC		25/138	81/179	189/242	263/44									2540	350	164/106
SPL	0715	AREA 2 TRW/NC		18/126	52/130	180/10	295/76									2540	350	24/63
		AREA 6 TRW/NC		98/122	181/143									55W		2540	400	181/122
	0837	AREA 7 TRW/NC		115/107	152/116	182/137								35W		2440	360	171/120
SPL	0918	CELL TRW/NC		160/124										D6		2540	380	TRop 420
SPL	0936	AREA 6 TRW/NC		90/145	166/190	184/206	245/110									2440	370	138/116 TRop 420
	1045	AREA 4 TRW/NC		103/120	112/15	163/200	221/85	54/95								2541.0	350	134/118 APPNT TRW+ 164/167
SPL	1120	CELL TRW+/NEW		144/116										D6		2542	400	TRop 420
SPL	1135	AREA 3 TRW+/+		97/150	162/200	155/105										2546	430	132/116 A INDCTD TRop 420
SPL	1150	CELL TRW++/+		131/118										D10		2550	450	A INDCTD 10 MI SE SYLVANIA, Ga
SPL	1210	CELL TRW+/-		120/124										D10		2454	420	
	1240	AREA 1 TRW/-		105/150	153/208	153/125	238/15									2450	330	132/113
	1335	AREA 3 TRW/NC		100/125	115/135	134/125	138/115									2345	340	114/125
	1435	AREA 1 RW-/NC		92/170	116/155	122/135	111/110									2345	210	114/120
	1535	AREA 1 TRW		89/145	103/165	110/135												
	1640																	PPINE (CAM 250NM LEVEL IS MIN AT 1618)
	1536	CELL TRW		25/170										D3				
	1940																	PPINE
	2040																	PPINE
	2340																	PPINE

MF 7-60 REPLACES WBAN FORM 60 WHICH MAY BE USED UNTIL STOCKS ARE EXHAUSTED.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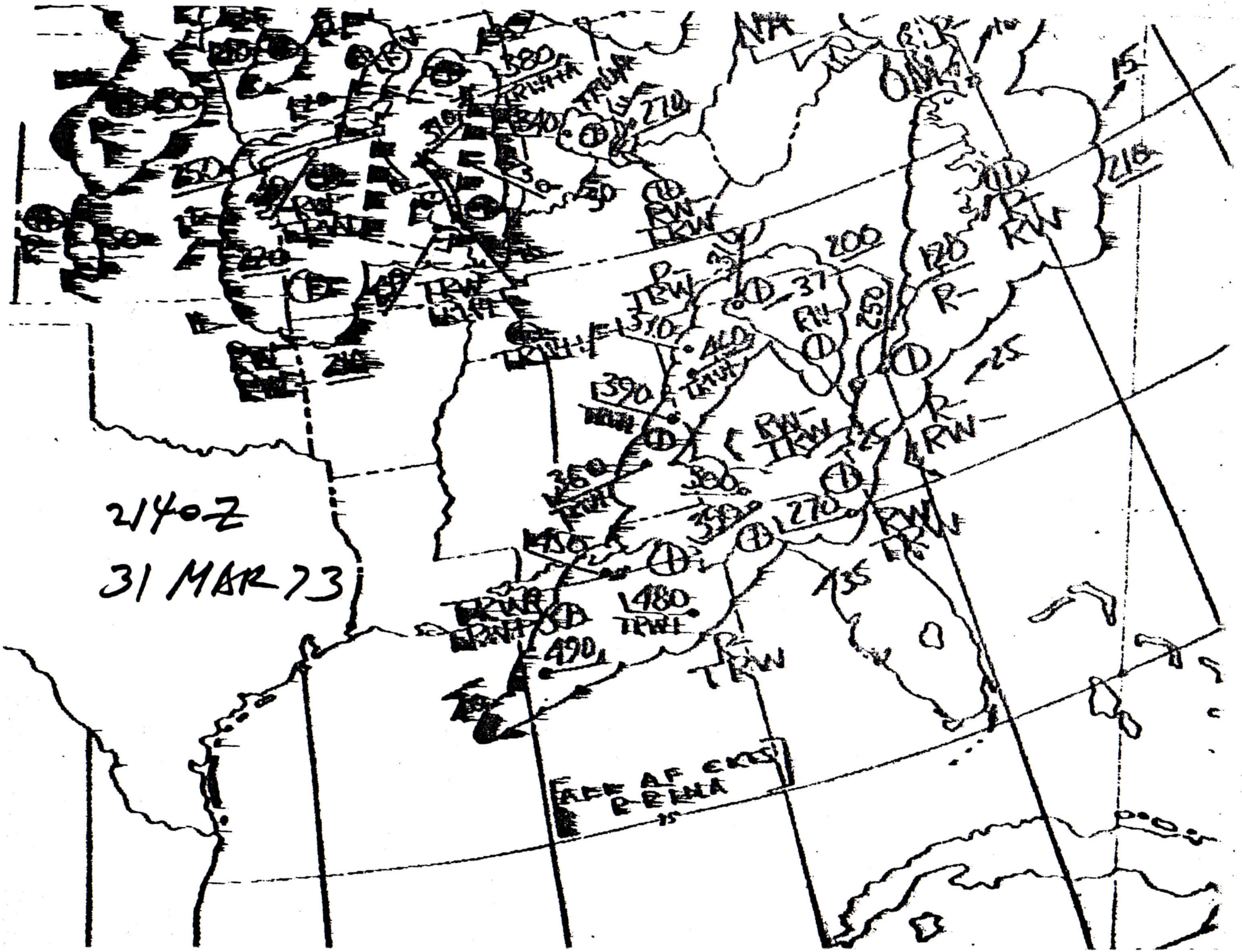
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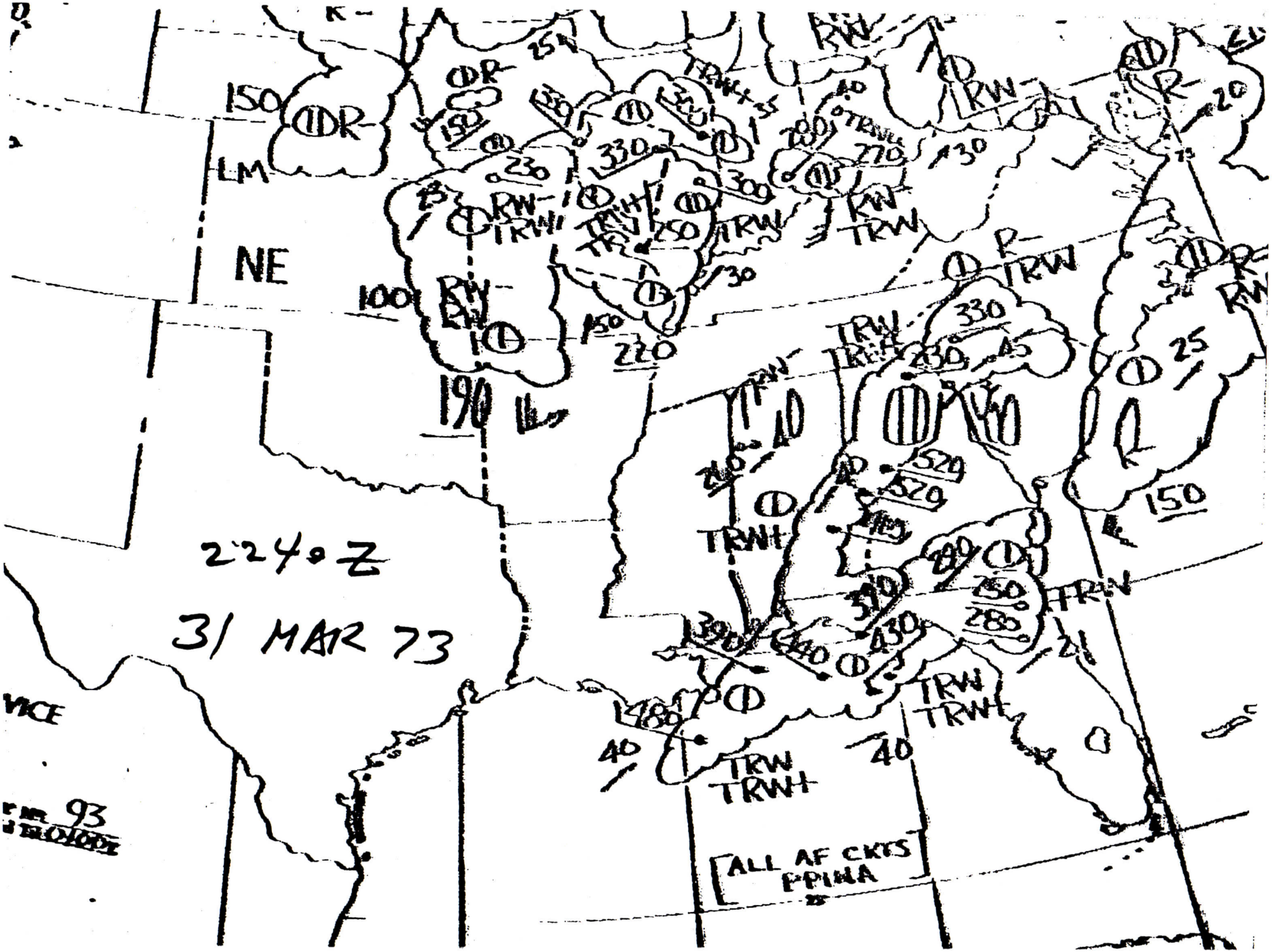
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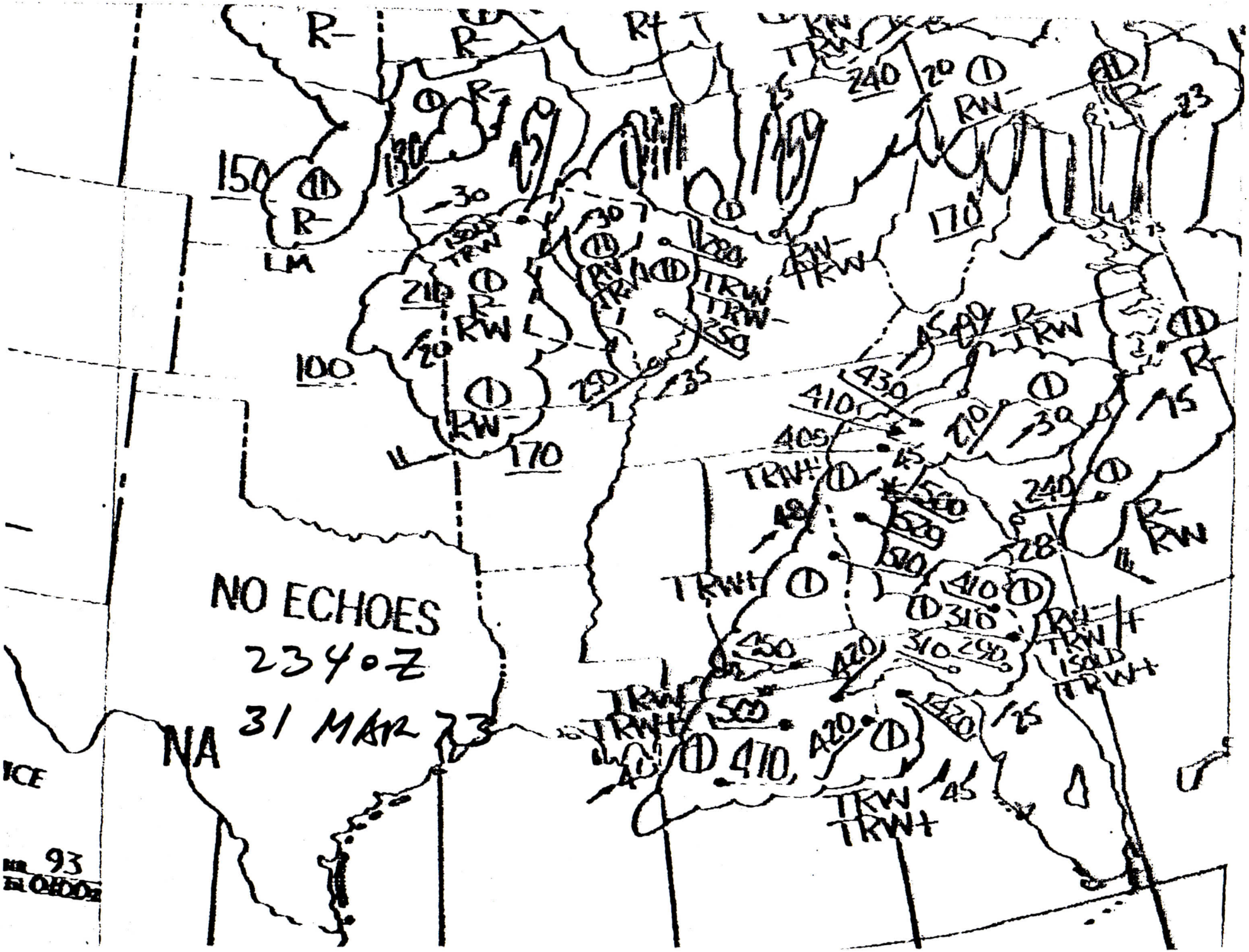
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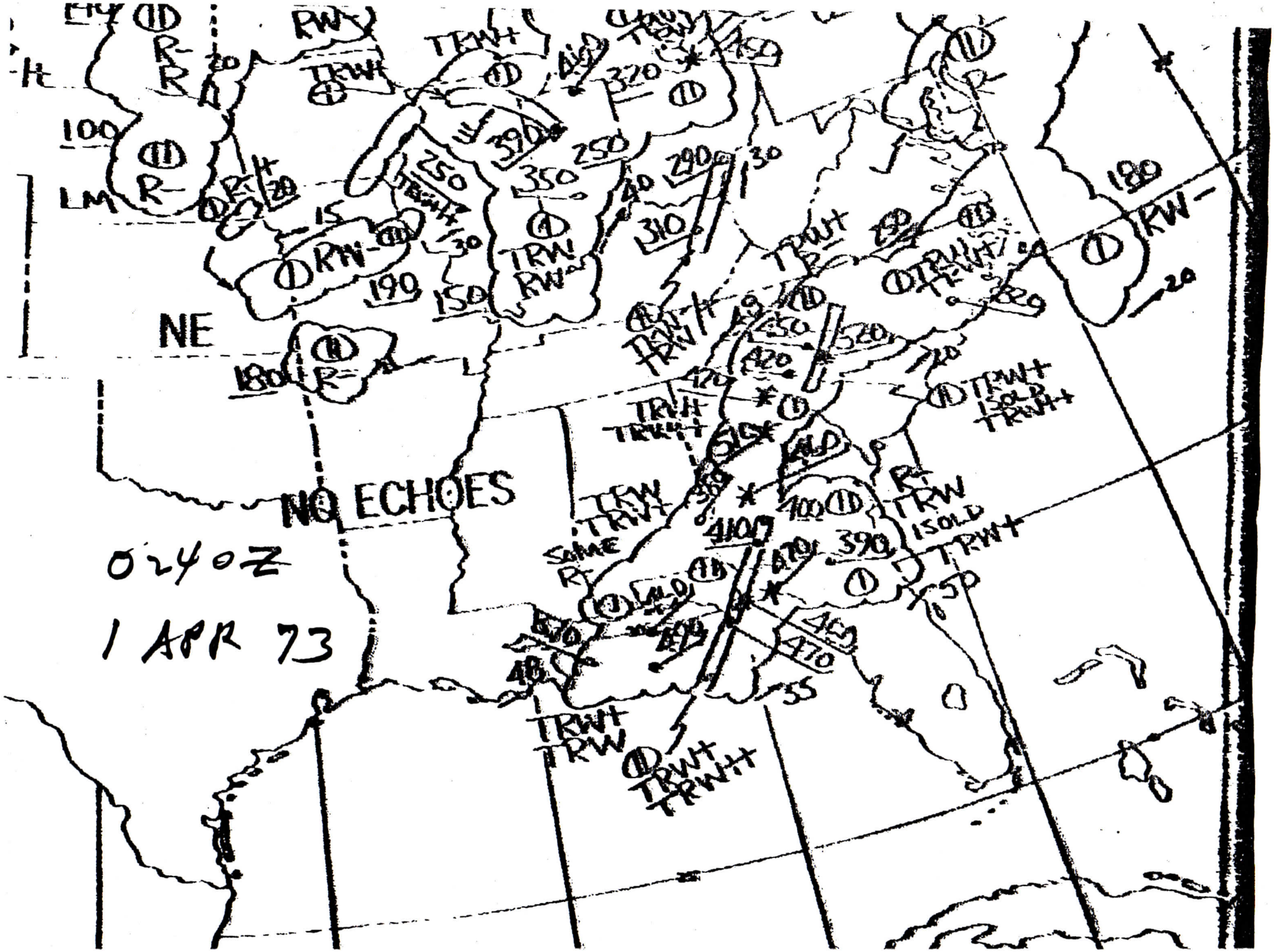
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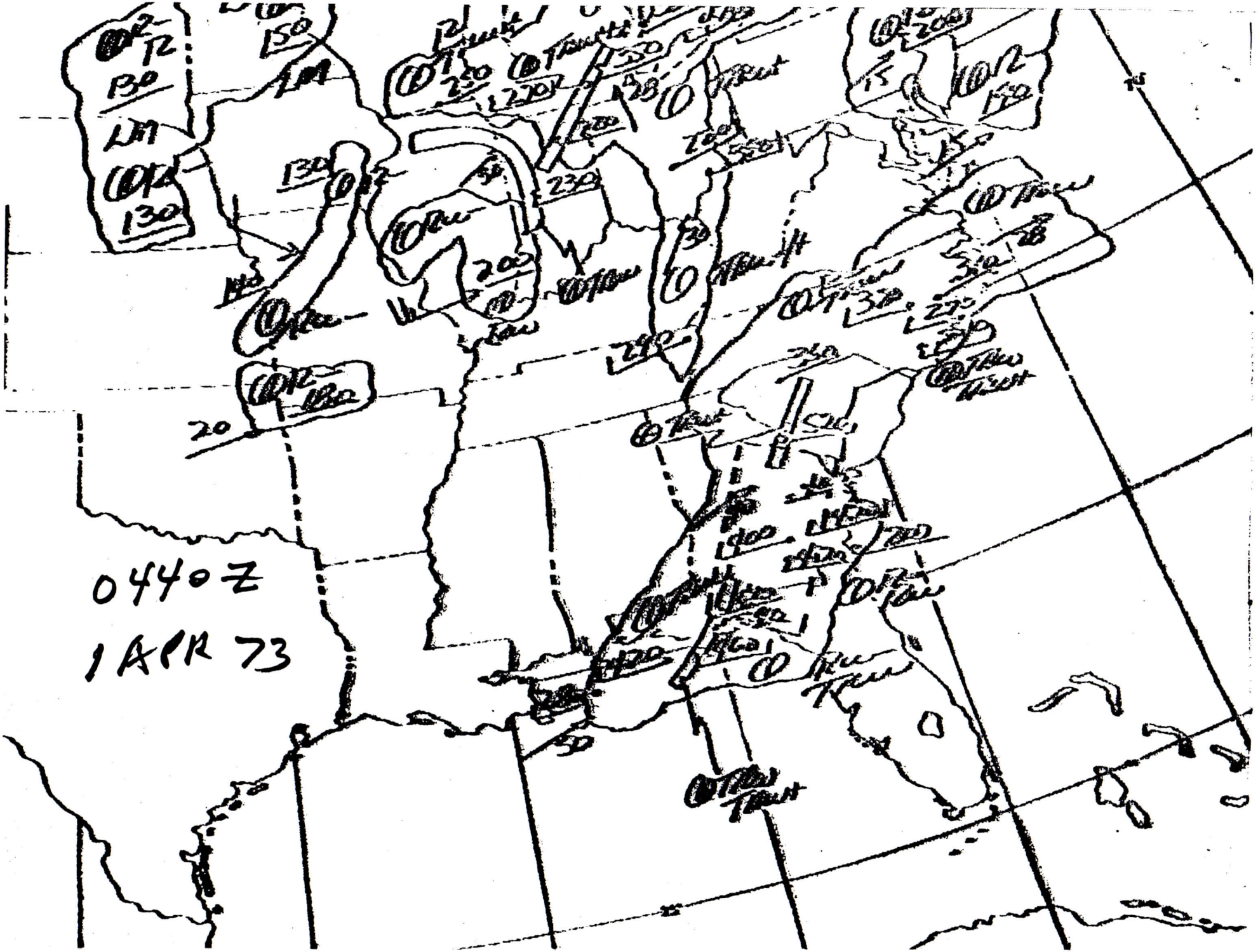
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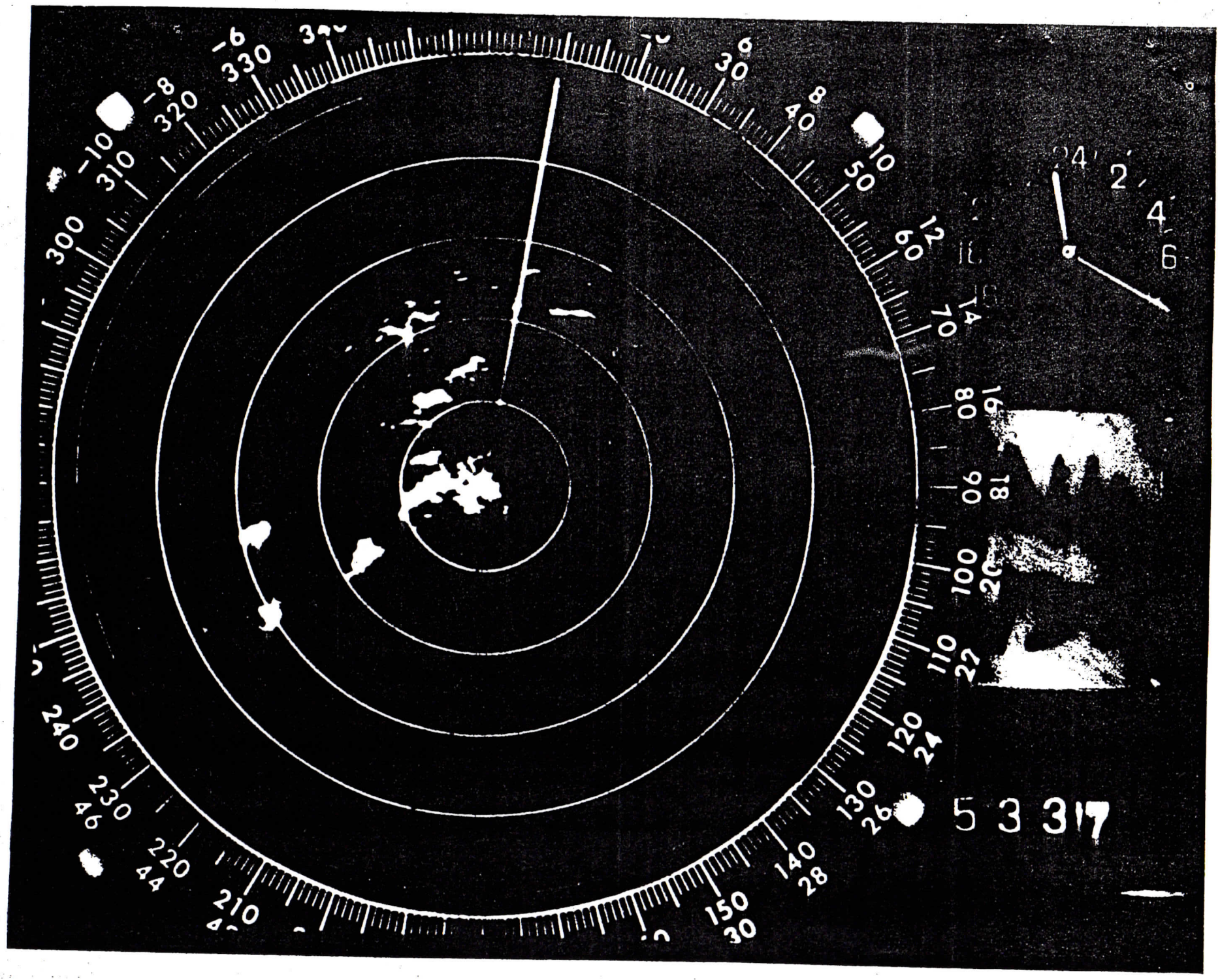

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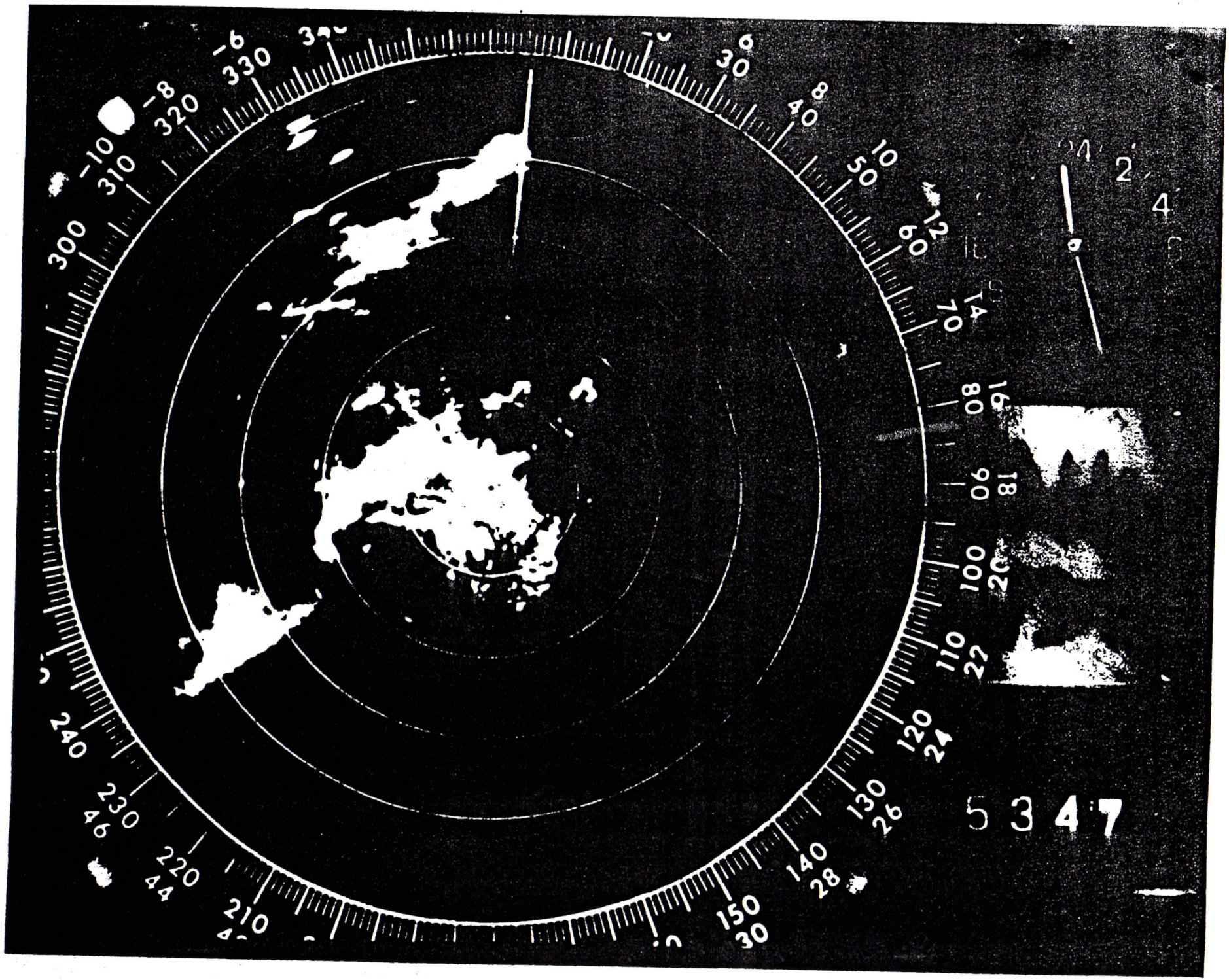
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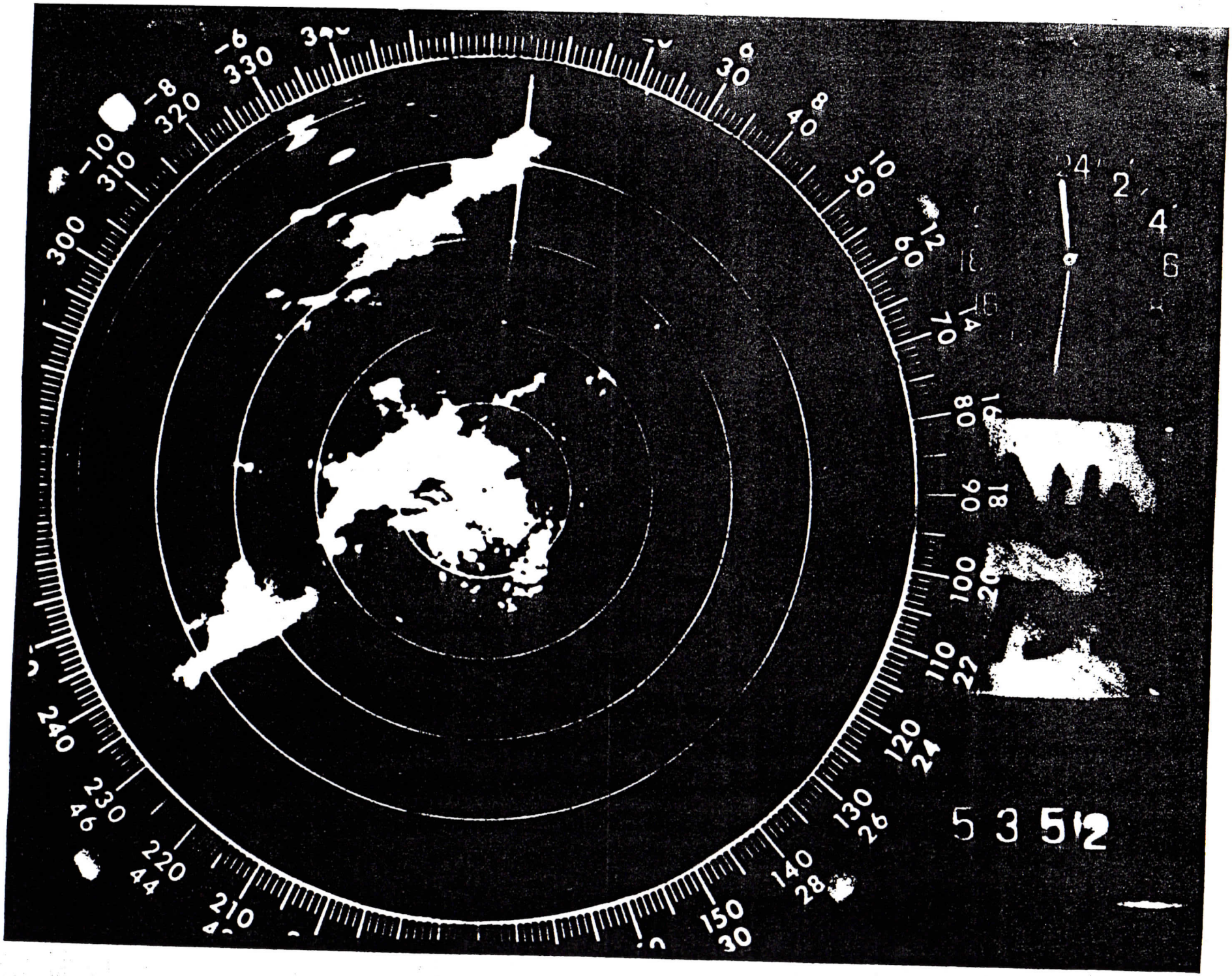

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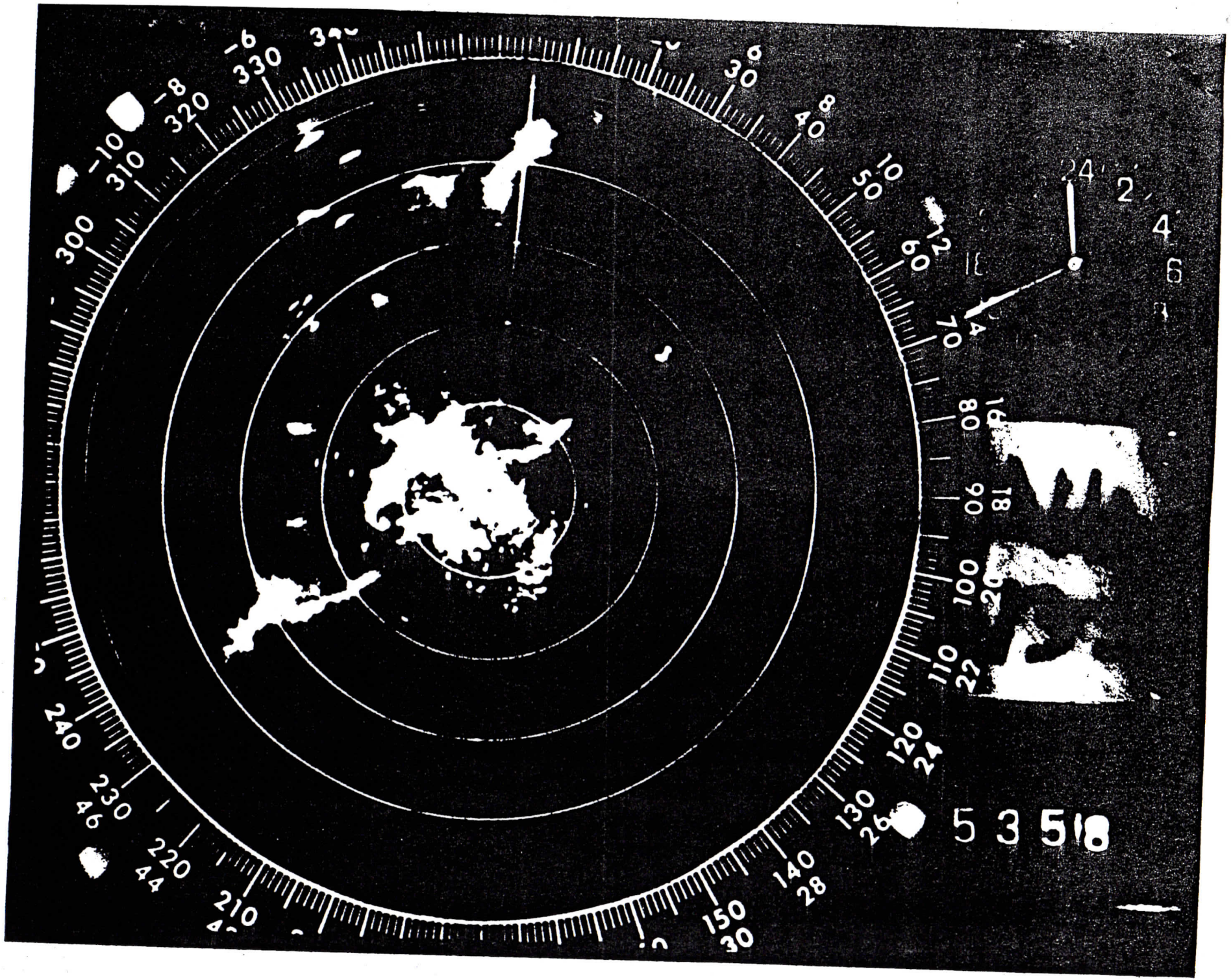

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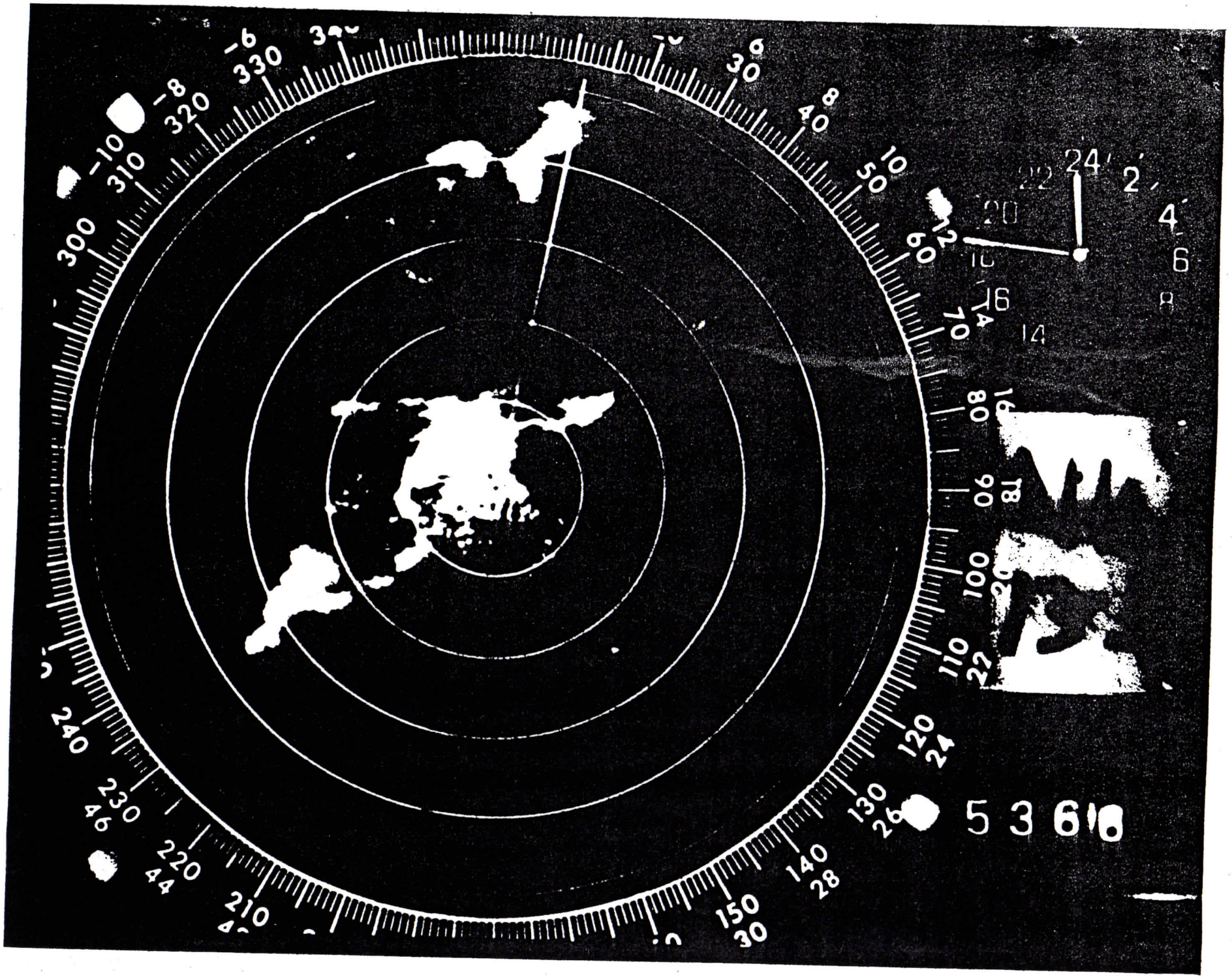

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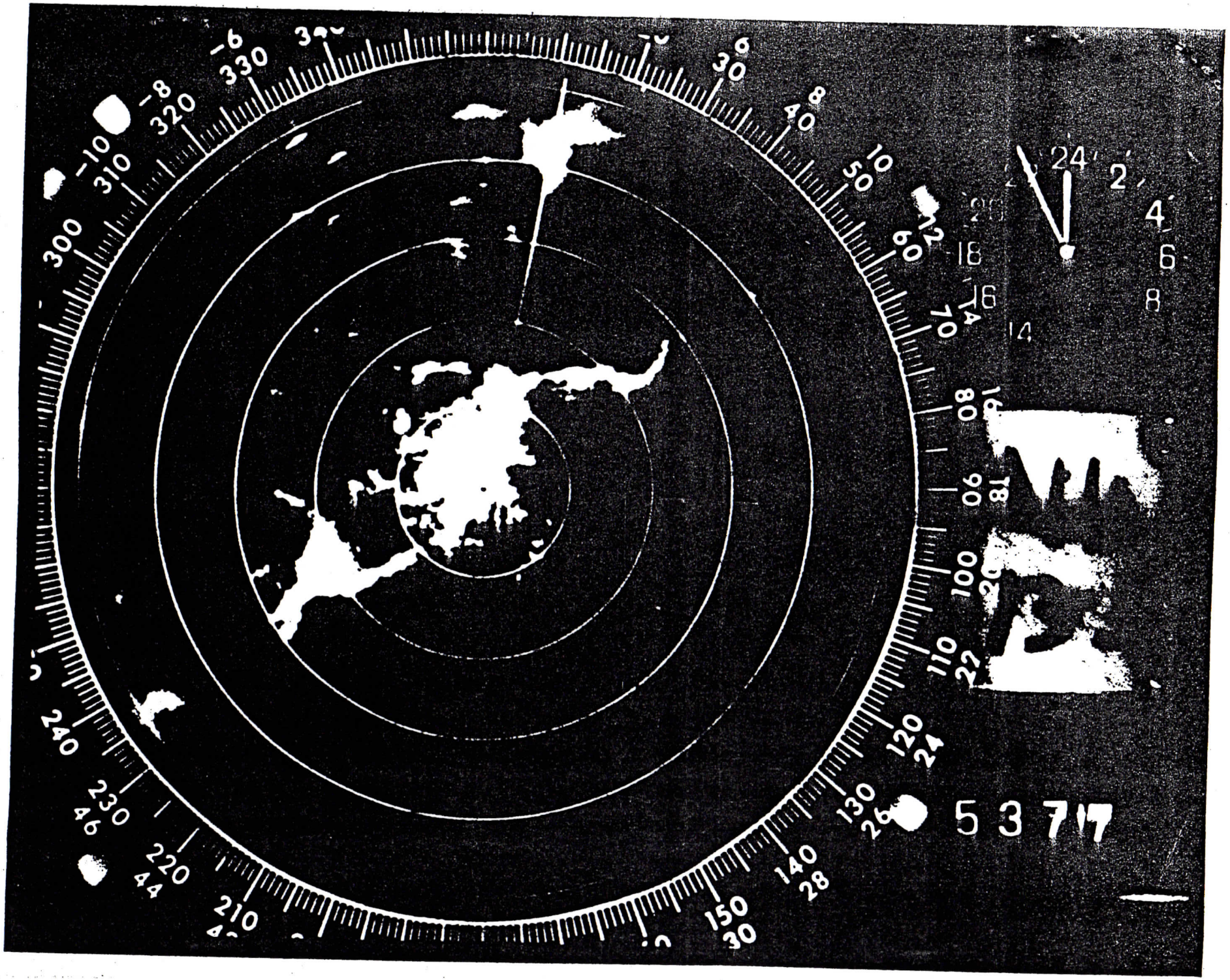

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