

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



CEN24FA179

METEOROLOGY

Specialist's Factual Report

June 18, 2024

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A. ACCIDENT

Location: Marianna, Arkansas
Date: May 12, 2024
Time: 1956 central daylight time
0056 universal coordinate time (UTC) on May 13, 2024
Airplane: Piper PA46-500 TP Malibu; Registration: N241PM

B. METEOROLOGY SPECIALIST

Donald Eick
NTSB Senior Meteorologist
National Transportation Safety Board
Washington, D.C.

C. SUMMARY

On May 12, 2024, about 1956 central daylight time, a Piper PA46-500TP airplane, N241PM, was substantially damaged when it was involved in an accident near Marianna, Arkansas. The pilot and passenger were fatally injured. The airplane was operated as a Title 14 Code of Federal Regulations Part 91 personal flight. The pilot had filed an instrument flight rules flight plan from the Pensacola International Airport (PNS), Pensacola, Florida, to Batesville Regional Airport (BVX), Batesville, Arkansas.

D. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's Senior Meteorologist was not on scene for this investigation and conducted the meteorology phase of the investigation remotely, collecting data from official National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) sources including the Weather Prediction Center (WPC), and the National Center for Environmental Information (NCEI). This report documents the general weather products and forecasts over the region during the period and documents the pertinent meteorological parameters to the accident. All times are reported as central daylight time (CDT) based upon the 24-hour clock, local time is -5 hours from UTC, and UTC=Z. Airport and NWS station identifiers use the standard International Civil Aviation Organization 4-letter station identifiers versus the International Air Transport Association 3-letter identifiers, which deletes the initial country code designator "K" for U.S. continental airports. Directions are referenced to true north and distances in nautical miles. Heights are in

feet (ft) above mean sea level (msl) unless otherwise noted. Visibility is in statute miles and fractions of statute miles.

The accident site is based on the coordinates of latitude 34.6581° N and longitude 90.59396° W, located in a field on the west bank of Cannon Lake.

E. FACTUAL INFORMATION

1.0 Synoptic Conditions

The synoptic or large-scale migratory weather systems influencing the area were documented using standard NWS charts issued by the National Center for Environmental Prediction (NCEP) and the WPC located in College Park, Maryland. These are the base products used in describing weather features and in the creation of forecasts and warnings. Reference to these charts and other products can be found in the Federal Aviation Administration (FAA) "Aviation Weather Handbook", FAA-H-8083-28¹.

1.1 Surface Analysis

The central south NWS Surface Analysis Chart for 1900 CDT is included as figure 1 with the approximate accident site marked by the red star. The chart depicted a trough² of low-pressure extending from Arkansas, northern Mississippi, Alabama, and into Georgia, which was located immediately northeast of the accident site. A high-pressure system at 1015-hectopascals (hPa)³ was located over Tennessee, with another high over southern Mississippi with a ridge extending westward. Further south, a stationary front extended along the Texas, Louisiana, Mississippi, Alabama Gulf coastal sections into southern Georgia. The station models surrounding the accident site depicted generally light southerly winds of 5 to 10 knots, broken sky cover, with temperatures near 77° Fahrenheit (F), and dew point temperature in the upper 60's to 77°F. Light rain was depicted from southern Arkansas, northern Louisiana, and eastern Texas, generally west of the general route of flight.

¹ <https://www.faa.gov/regulationspolicies/handbooksmanuals/aviation/faa-h-8083-28-aviation-weather-handbook>

² Trough or abbreviated "TROF" is an elongated area of low-pressure and is if sufficient moisture and lifting is available supports clouds and precipitation formation.

³ Hectopascals (hPa) is the standard unit for reporting sea-level pressure and is interchangeable with the former term millibar (mb) with the same units. The standard atmosphere is based on a sea-level pressure of 1013.2-hPa at 59° Fahrenheit (F) or 15° Celsius (C).

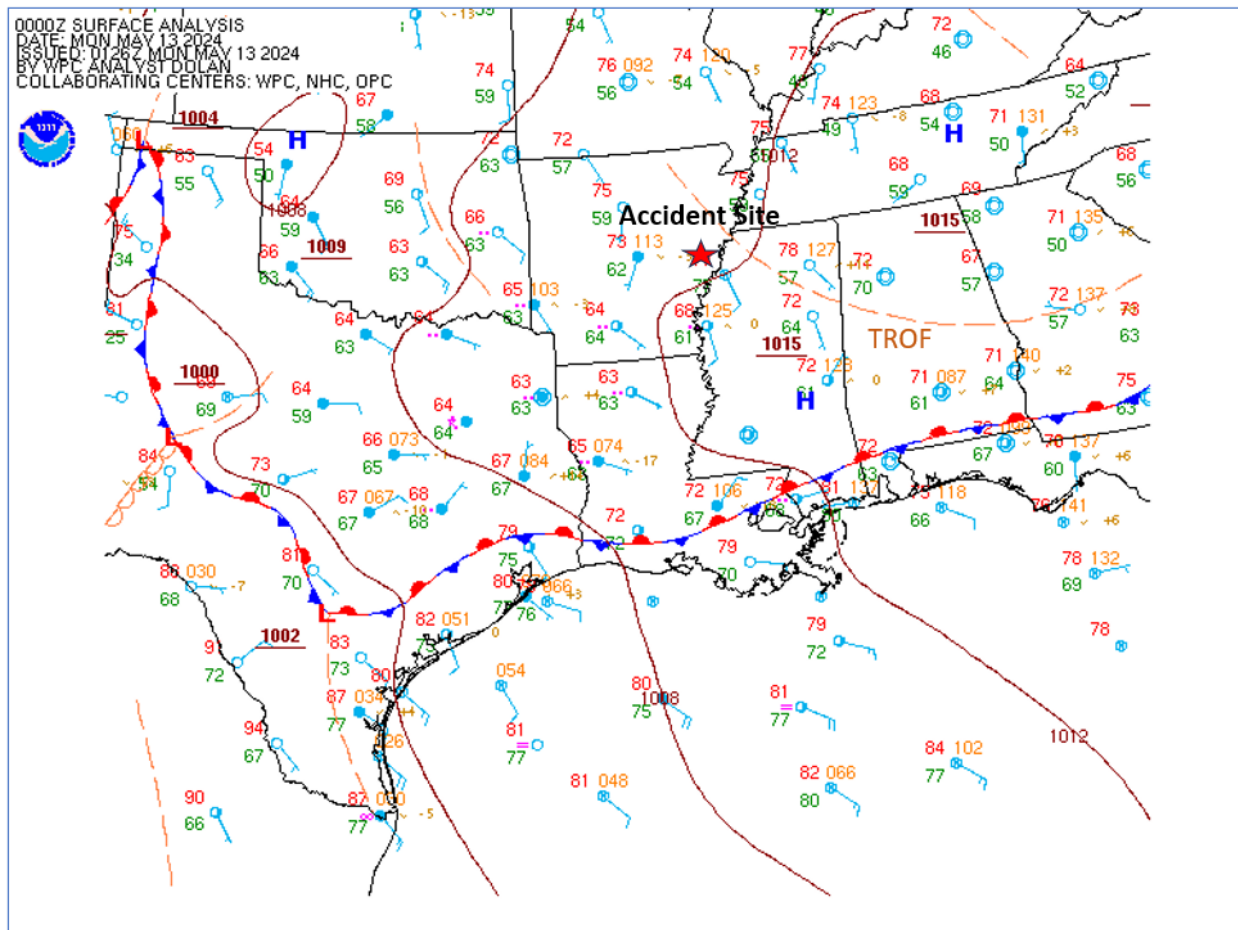


Figure 1 - NWS central south Surface Analysis Chart for 1900 CDT with the accident site marked.

1.2 Regional Radar Mosaic

A regional view of the NWS NCEI National Composite Radar Mosaic for 1955 CDT is included as figure 2. The image depicted an area of light intensity echoes immediately south of the accident site, with light intensity echoes over a portion of the route of flight. Stronger reflectivities of 40 dBZ and greater were depicted further south over Louisiana and Mississippi, which were associated with moderate rain by the station models (figure 1). Based on the potential of echoes along the flight path, the closest NWS weather radar will be further documented in section 5.0 of this report.

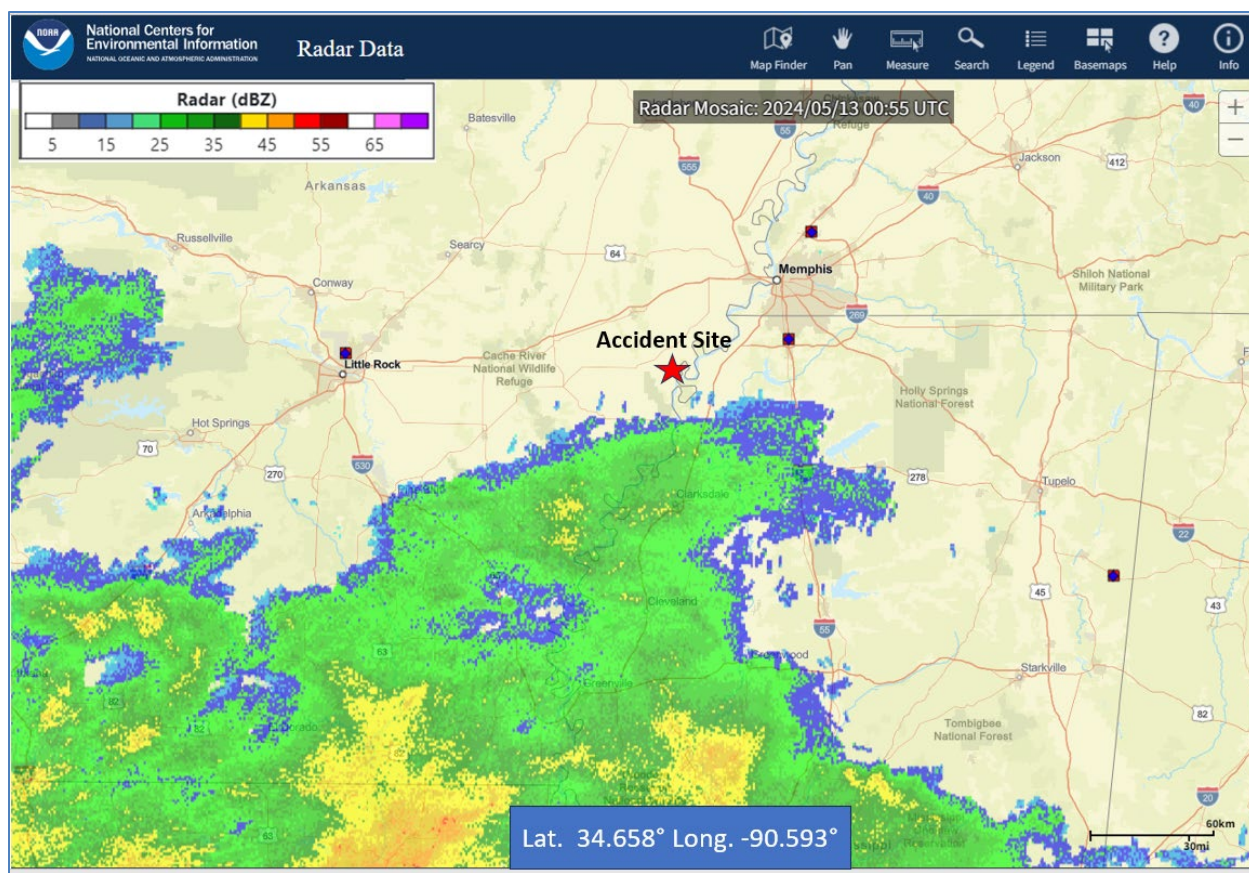


Figure 2 - Regional Composite Radar Mosaic for 1955 CDT over the accident site.

2.0 Surface Observation

The area surrounding the accident site was documented using official Aviation Routine Weather Reports (METAR) and Aviation Selected Special Weather Reports (SPECI). Cloud heights are reported above ground level (agl) in the following section. The magnetic variation over the area was estimated at 1° West based on the latest sectional chart for the area.

2.1 Tunica, Mississippi

The closest official weather reporting location was from Tunica Municipal Airport (KUTA), Tunica, Mississippi, located about 15 miles east of the accident site at an elevation of 194 ft. The airport had an Automated Weather Observation System (AWOS) which disseminates reports longline every 20-minutes or every minute on 118.075 VHF locally by line of sight. At the approximate time of the accident the following conditions were reported.

Tunica Municipal Airport weather at 1955 CDT, automated, wind from 160° at 8 knots, visibility 9 miles, a few clouds at 10,000 ft agl, scattered clouds at 12,000 ft, temperature 23°C (73°F), dewpoint temperature 19°C (65°F), and altimeter 29.89 inches of mercury. Remarks: automated observation system with a precipitation discriminator, temperature 23.0°C, dew point 18.5°C.

The raw observations in standard code and abbreviations with time referenced to UTC were as follows:

METAR KUTA 122255Z AUTO 13007KT 9SM CLR 25/18 A2988 RMK AO2 T02480179 \$=

METAR KUTA 122315Z AUTO 14009KT 9SM FEW100 25/18 A2989 RMK AO2 T02470178 \$=

METAR KUTA 122335Z AUTO 14008KT 9SM SCT100 24/18 A2988 RMK AO2 LTG DSNT SW T02430180\$

METAR KUTA 122355Z AUTO 14007KT 10SM FEW100 24/18 A2987 RMK AO2 T02400180 \$=

METAR KUTA 130015Z AUTO 14007KT 10SM FEW110 24/18 A2987 RMK AO2 T02360181

METAR KUTA 130035Z AUTO 13007KT 9SM BKN100 23/18 A2987 RMK AO2 T02330184

METAR KUTA 130055Z AUTO 16008KT 9SM FEW100 SCT120 23/19 A2989 RMK AO2 T02300185

Accident 0056Z

METAR KUTA 130115Z AUTO 18005KT 10SM BKN120 23/18 A2989 RMK AO2 T02320178

METAR KUTA 130135Z AUTO 17007KT 10SM OVC110 23/17 A2988 RMK AO2 LTG DSNT SW
T02300173

METAR KUTA 130155Z AUTO 18008KT 10SM BKN110 OVC190 23/17 A2988 RMK AO2 T02320170

METAR KUTA 130215Z AUTO 17006KT 10SM SCT110 OVC190 23/17 A2987 RMK AO2 T02270169

METAR KUTA 130235Z AUTO 19007KT 10SM OVC190 23/16 A2990 RMK AO2 PRESRR T02290164

METAR KUTA 130255Z AUTO 21014KT 10SM SCT110 BKN130 OVC190 22/17 A2990 RMK AO2 LTG
DSNT SW T02230170

METAR KUTA 130315Z AUTO 21009KT 10SM OVC110 22/17 A2991 RMK AO2 T02150174

METAR KUTA 130335Z AUTO 22009KT 10SM OVC100 21/17 A2992 RMK AO2 LTG DSNT SW
T02110171

A depiction of the NWS Aviation Weather Center's (AWC) METAR display with the approximate accident site marked and the regional radar mosaic overlaid is included as figure 3. The chart depicted the trough immediately east of the accident site with the band of rain about 10 miles south and extending across the southern portions of Arkansas. The station models surrounding the accident site indicated visual

flight rule (VFR) conditions⁴ prevailing with southerly winds of 5 to 10 knots, variable sky cover from scattered to overcast.

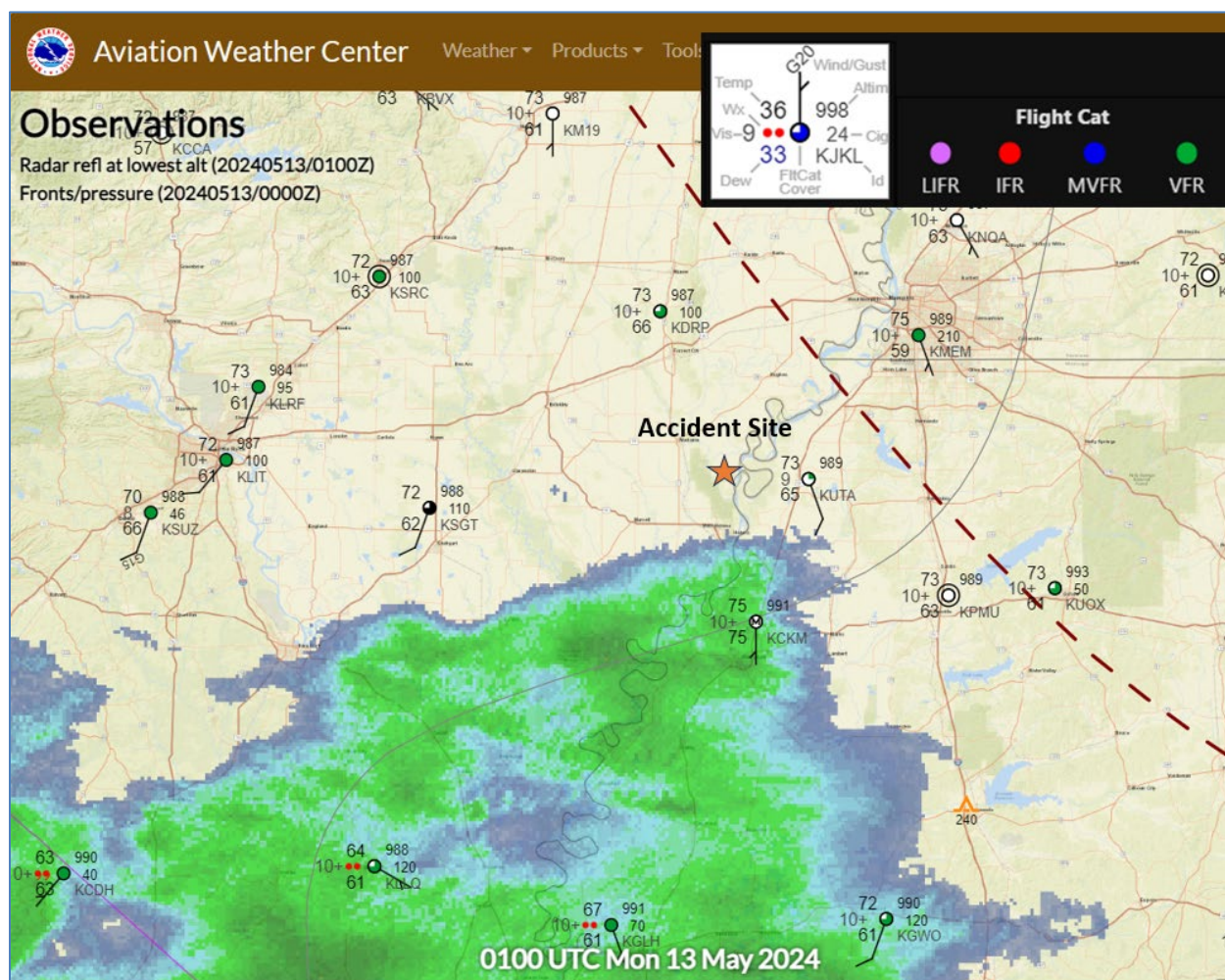


Figure 3 - NWS Aviation Weather Center METAR depiction for 2000 CDT with the accident site indicated by the red star. The regional radar mosaic and surface features have been added.

3.0 Upper Air Sounding

A High-Resolution Rapid Refresh (HRRR) numerical model⁵ data was obtained from the NOAA Air Resources Laboratory archive for 2000 CDT for the nearest grid point to the accident site. The data was then plotted on a standard Skew T/log P

⁴ VFR conditions are defined as a ceiling greater than 1,000 ft agl and/or visibility greater than 3 miles.

⁵ The HRRR is a NOAA real-time 3 kilometer (km) resolution, hourly-updated, cloud-resolving, convection-allowing atmospheric model, initialized by 3 km grids with 3 km radar assimilation. Radar data is assimilated in the HRRR every 15 minutes over a 1-hour period.

diagram⁶ using the RAOB Analysis software⁷ from the surface to 300-hPa or about 30,000 ft and is included as figure 4.

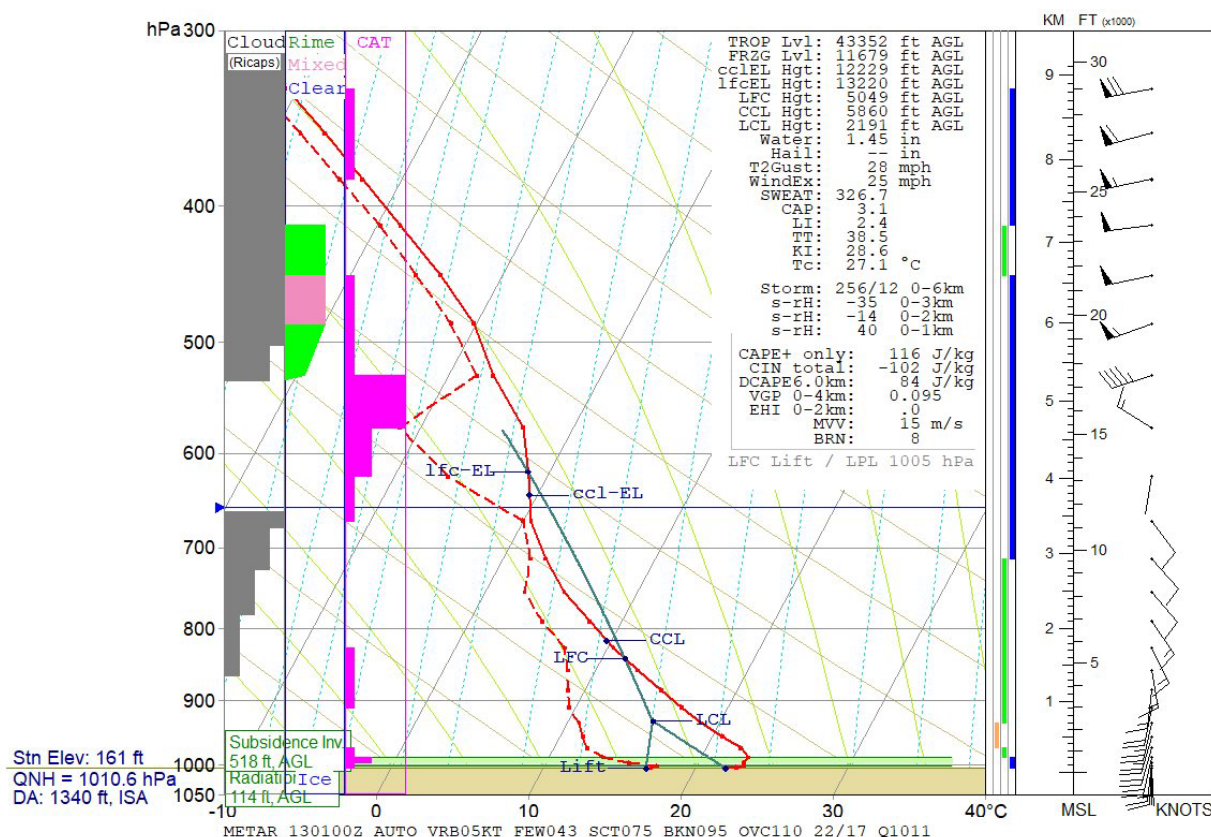


Figure 4 - High-Resolution Rapid Refresh (HRRR) numerical model sounding over the approximate accident site for 2000 CDT.

The sounding depicted an elevation of 161 ft, with a near surface temperature of 22°C (71.6F), a dew point temperature of 16.8°C (62.3F), a relative humidity of 72%, a sea-level pressure of 1005-hPa, resulting in a density altitude near 1,340 ft. A surface based temperature inversion was noted to about 500 ft. The lifted condensation level (LCL) at 2,191 ft agl, a level of free convection (LFC) at 5,049 ft agl, and a convective condensation level (CCL) at 5,860 ft agl. The freezing level was identified at 11,840 ft (blue line across sounding). The precipitable water content was 1.42 inches. The lifted index was 2.4, with the K-index of 28.6, and the convective available potential energy was 116 joules/kilogram, which indicated a conditionally unstable atmosphere. The sounding supported multiple layers of clouds (gray shading on left axis) with bases near 4,000 ft with tops near 12,000 ft, with a second layer of clouds between 17,000 ft

⁶ Skew T log P diagram - is a standard meteorological plot or thermodynamic diagram using temperature and the logarithmic of pressure as coordinates, used to display winds, temperature, dew point, and various indices used to define the vertical structure of the atmosphere.

⁷ RAOB -The Complete RAOBsonde OBservation program is an interactive sounding analysis program developed by Eosonde Research Services (ERS) previously known as Environmental Research Services, The Villages, Florida.

with tops to 43,000 ft. The sounding supported a risk of structural icing conditions between 18,000 ft and 24,000 ft, with rime to mixed type icing indicated.

The sounding wind profile indicated light and variable surface winds, with winds generally from the south which veered to the south-southeast through 10,000 ft. A low-level wind maximum was indicated near 1,500 ft agl with winds from 135° at 23 knots. Above 16,000 ft the winds shifted to the west-southwest with wind speeds rapidly increasing to 45 knots or more. The mean 0 to 6 km wind was from 225° at 16 knots. At Flight Level (FL)⁸ 280 the wind was from 260° at 65 knots with a temperature of -29°C. The RAOB Analysis program indicated strong vertical wind shears between 13,000 ft and 16,000 ft where the winds shifted and indicated a high possibility of moderate or greater turbulence within that layer.

The HRRR sounding parameters of height, pressure (Pres), temperature (T), dew point temperature (Td), relative humidity (RH), wind direction and speed, and derived Clear Air Turbulence (CAT), Low-Level Wind Shear (LLWS), and icing potential from the surface through 35,000 ft.

Height (ft-msl)	Pres (hPa)	T (°C)	Td (°C)	RH (%)	Wind (dir/kts)	CAT (FAA)	LLWS (FAA)	Icing (USAF)
161	1005	22.0	16.8	72	178/ 5			
189	1004	22.7	17.1	71	180/ 5	LGT	MODRT	
275	1001	23.1	17.4	70	183/ 10	LGT	LIGHT	
419	996	23.0	15.5	63	186/ 13	MDT	LIGHT	
679	987	23.1	13.6	55	192/ 19	LGT		
1117	972	22.3	12.2	53	195/ 22			
1649	954	20.7	11.5	56	195/ 23			
2279	933	18.8	10.8	60	193/ 23			
2981	910	17.0	9.6	62	191/ 21	LGT		
3790	884	15.0	8.9	67	186/ 17	LGT		
4682	856	12.8	8.2	74	171/ 15	LGT		
5696	825	10.4	7.2	81	157/ 16			
6877	790	7.9	4.8	81	148/ 15			
8171	753	5.2	2.6	83	142/ 12			
9630	713	2.8	1.8	93	141/ 11			
11278	670	0.5	0.0	96	146/ 9	LGT		
13190	623	-1.2	-6.5	67	189/ 1	MDT		
15281	575	-3.3	-11.4	53	304/ 16	XTR		
17481	528	-7.1	-8.2	92	251/ 47	LGT		TRC Rime
19645	485	-10.2	-11.7	89	249/ 54	LGT		LGT Rime
21639	448	-14.1	-15.7	88	257/ 52			LGT Mixed
23649	413	-18.5	-19.8	89	262/ 52			LGT Rime
25481	383	-22.6	-24.1	88	258/ 53	LGT		
27295	355	-26.7	-28.3	86	254/ 62	LGT		
29011	330	-30.8	-32.5	85	258/ 70			
32134	288	-38.2	-40.2	81	254/ 74	LGT		
35013	253	-45.8	-48.5	74	259/ 83			

⁸ Flight Level (FL) is reference to pressure altitude with the aircraft's altimeter set to standard sea-level pressure of 1013.25-hPa or 29.92 inHg, and is used to reference to altitude above 18,000 ft.

4.0 Satellite Imagery

The NOAA Geostationary Operational Environmental Satellite number 16 (GOES-16) infrared imagery were obtained from an archive at the Space Science Engineering Center (SSEC) at the University of Wisconsin-Madison in Madison, Wisconsin, and processed using the Man-computer Interactive Data Access System (McIDAS) software. The infrared band 13 imagery at a wavelength of 10.3 microns (μm) provided a spatial resolution of 2 kilometers (km), while the visible (band 2) at a wavelength of $0.64\ \mu\text{m}$ provided a resolution of 0.5 km. A satellite outage was reported surrounding the period of the accident from 1916 through 2100 CDT where no imagery was available.

Figures 5 and 6 are the GOES-16 infrared and visible imagery for 1916 CDT or the last imagery prior to the accident. Several defined cumulonimbus cloud clusters are identified over northeast Texas, northern Louisiana, into southern Arkansas with an extensive area of mid to high level cirriform clouds extending northeastward over the accident site. The radiative cloud top temperature over the accident site was 220 Kelvin or -53°C , which corresponded to cloud tops near 38,000 ft based on the HRRR sounding. Figure 7 is the GOES-16 infrared image for 2101 CDT immediately after the accident at 4X magnification, the radiative cloud brightness temperature was 224 Kelvin or -49°C over the accident site.

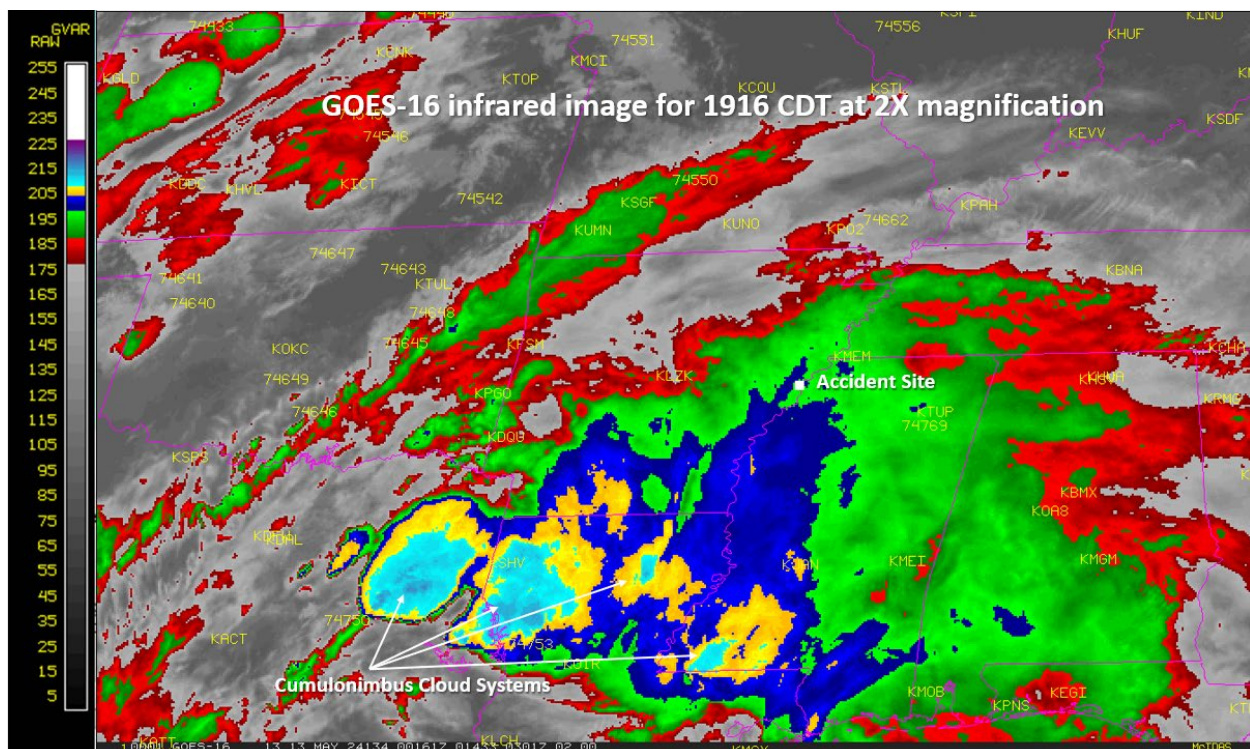


Figure 5 - GOES-16 infrared image for 1916 CDT at 2X magnification with the accident site indicated by the white square.

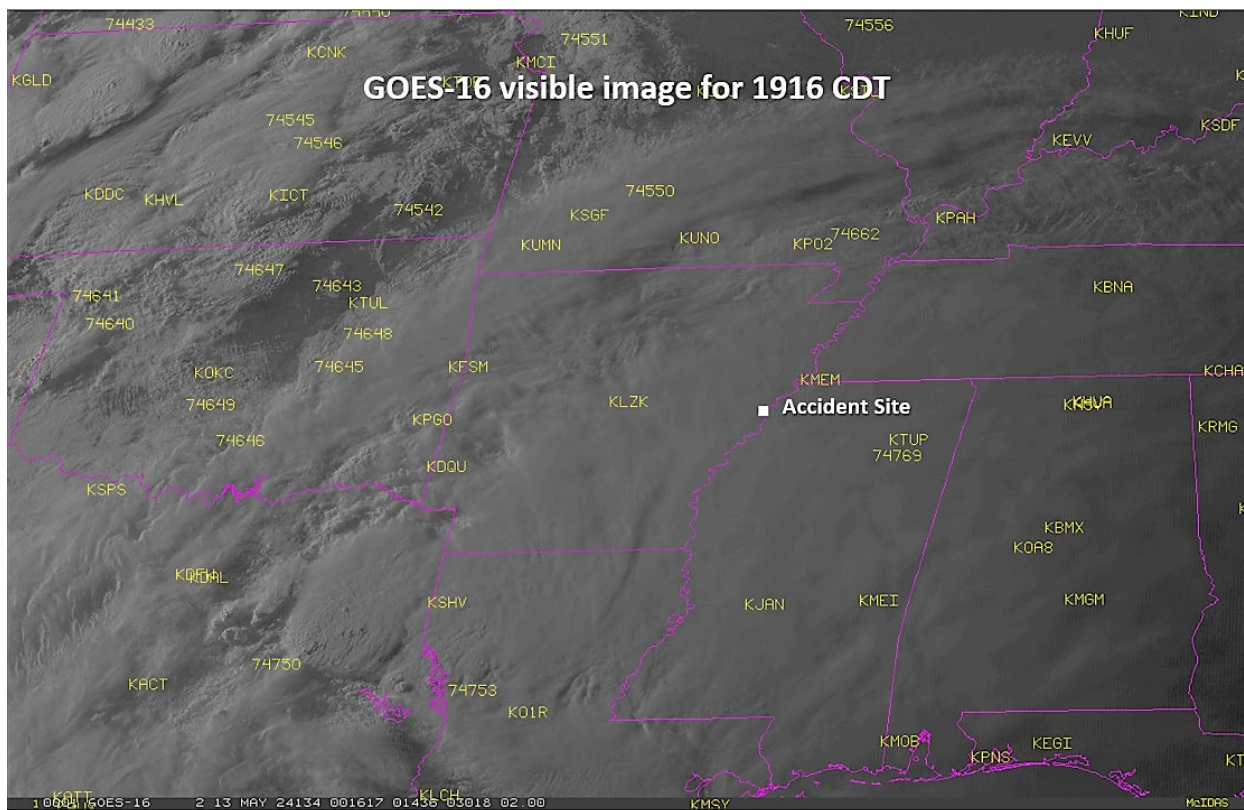


Figure 6 - GOES-16 visible image for 1916 CDT at -2X magnification with accident site marked by the white square.

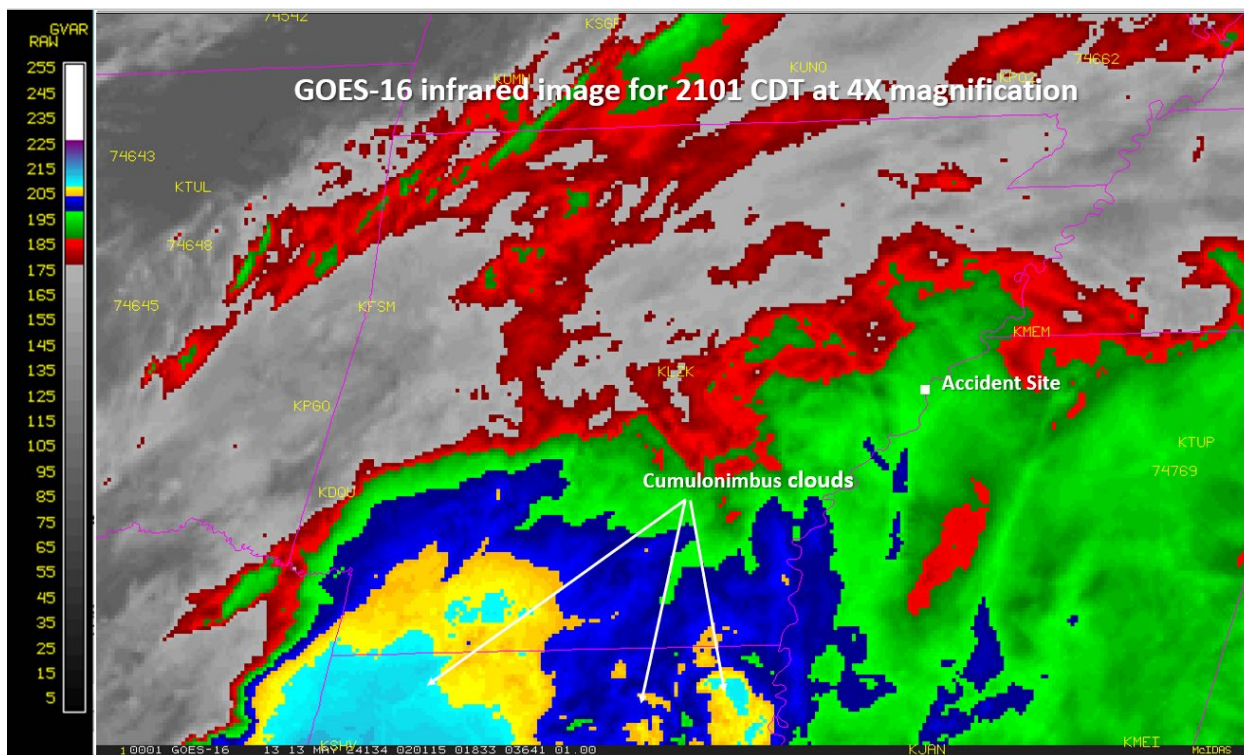


Figure 7 - GOES-16 infrared image for 2101 CDT at 4X magnification with accident site.

5.0 Weather Radar Imagery

The NWS Memphis (KNQA), Tennessee, Weather Surveillance Radar 1988 Doppler (WSR-88D) was located about 54 miles northeast of the accident site. The Level II radar data was obtained from the NWS NCEI and plotted using the NOAA Weather Tool kit software. During the period the KNQA WSR-88D was operating in the clear air mode, volume coverage pattern (VCP) 35 where the radar makes 9 elevation scans during a 7-minute period. The following table are the estimated beam heights at the various elevation scans over the accident site assuming standard refraction of the WSR-88D beam, which had an antenna height of 435 ft. The heights have been rounded to the nearest 10 ft.

Elevation	Center of Beam	Base	Top
0.5°	6,000 ft	2,980 ft	9,020 ft
1.28°	10,960 ft	7,940 ft	13,990 ft
2.37°	17,890 ft	14,870 ft	20,920 ft
3.08°	22,530 ft	19,510 ft	25,550 ft
3.96°	27,990 ft	24,960 ft	31,010 ft

Reflectivity is the measure of the efficiency of a target in intercepting and returning radio energy. With hydrometeors⁹, it is a function of the drop size distribution, number of particles per unit volume, physical state (ice or water), shape, and aspect. Reflectivity is normally displayed in dBZ and is a general measure of echo intensity. The FAA Aviation Weather Handbook¹⁰ defines echoes less than 30 dBZ as "light" in intensity, "moderate" echoes 30-40 dBZ, "heavy" with echoes of >40-50 dBZ, and "extreme" intensity with echoes above >50 dBZ. These are the new standard radio phraseology terms used by air traffic controllers to describe weather conditions to pilots as shown in the table below. Light rain is typically reported at the surface when reflectivities reach 20 dBZ, while air traffic control weather displays, and airborne weather radar typically do not display echoes less than 30 dBZ or light intensity echoes on their weather displays.

Reflectivity (dBZ) Ranges	Weather Radar Echo Intensity Terminology
<30 dBZ	Light
30 - 40 dBZ	Moderate
>40 - 50 dBZ	Heavy
>50 dBZ	Extreme

⁹ Hydrometeors are any product of condensation or sublimation of atmospheric water vapor, whether formed in the free atmosphere or at the earth's surface. Hydrometeors are classified as; (a) Liquid or solid water particles suspended in the air: cloud, water droplets, mist or fog. (b) Liquid precipitation: drizzle and rain. (c) Freezing precipitation: freezing drizzle and freezing rain. (d) Solid (frozen) precipitation: ice pellets, hail, snow, snow pellets, and ice crystals.

¹⁰ FAA Aviation Weather Handbook - WSR-88D Radar Precipitation Intensity Terminology (Table 24-8).

Figures 8-11 are the KNQA WSR-88D radar images as various elevation angles depicting the accident aircrafts flight track on descent at 1949, 1954, and 1959 CDT as it descended from 24,000 ft and encountered light intensity echoes of 25 dBZ or less. The presence of the echoes indicated that the accident airplane was in clouds or instrument meteorological conditions (IMC) and based on the temperature profile, the cloud droplets and precipitation were in the supercooled liquid state and structural icing conditions. No significant echoes were depicted at the surface over the accident site, which indicated that precipitation was not reaching the surface.

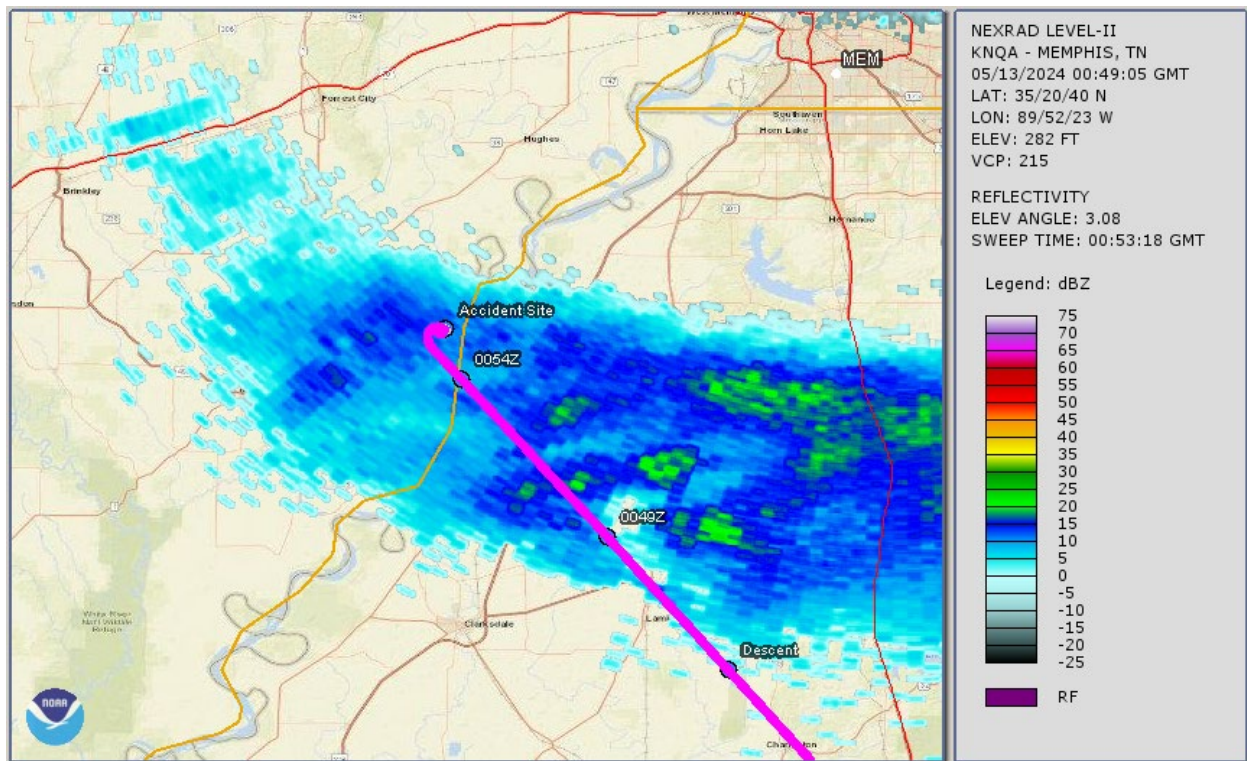


Figure 8 - KNQA WSR-88D 3.08° base reflectivity image for 1949 CDT with flight track.

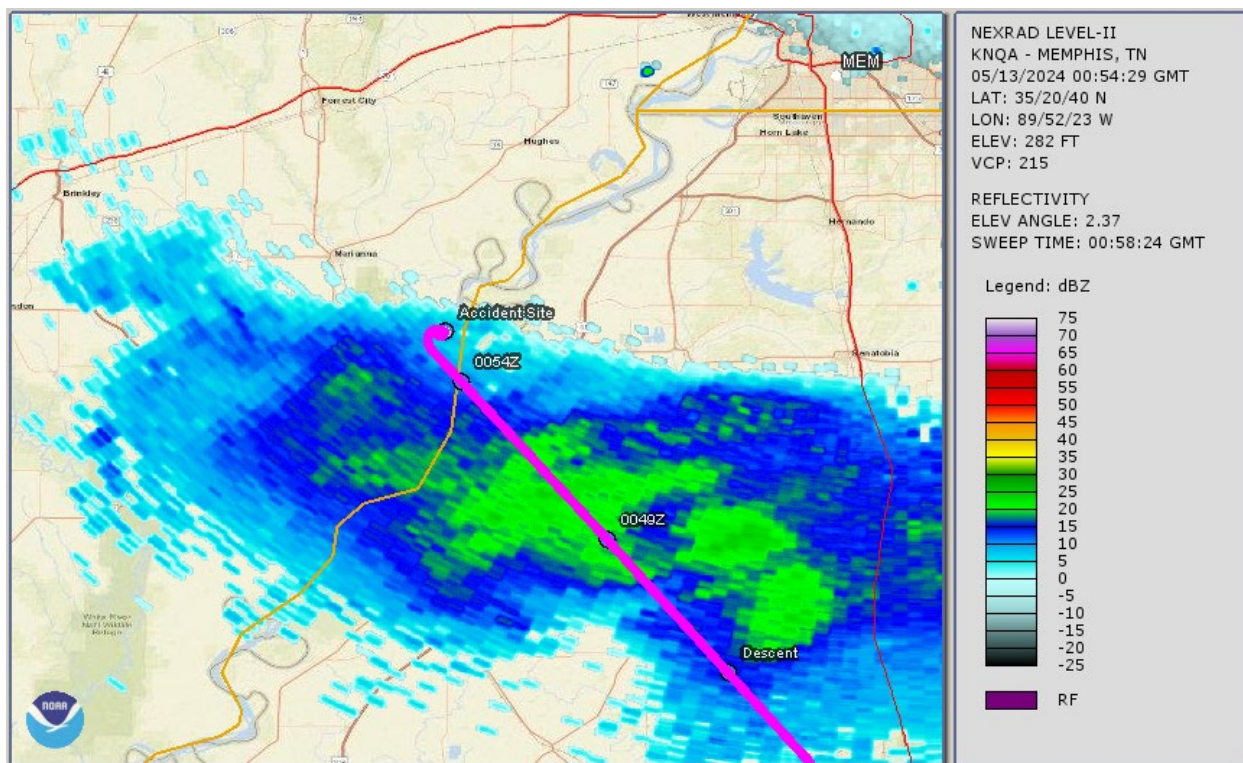


Figure 9 - KNQA WSR-88D 2.37° base reflectivity image for 1954 CDT with flight track.

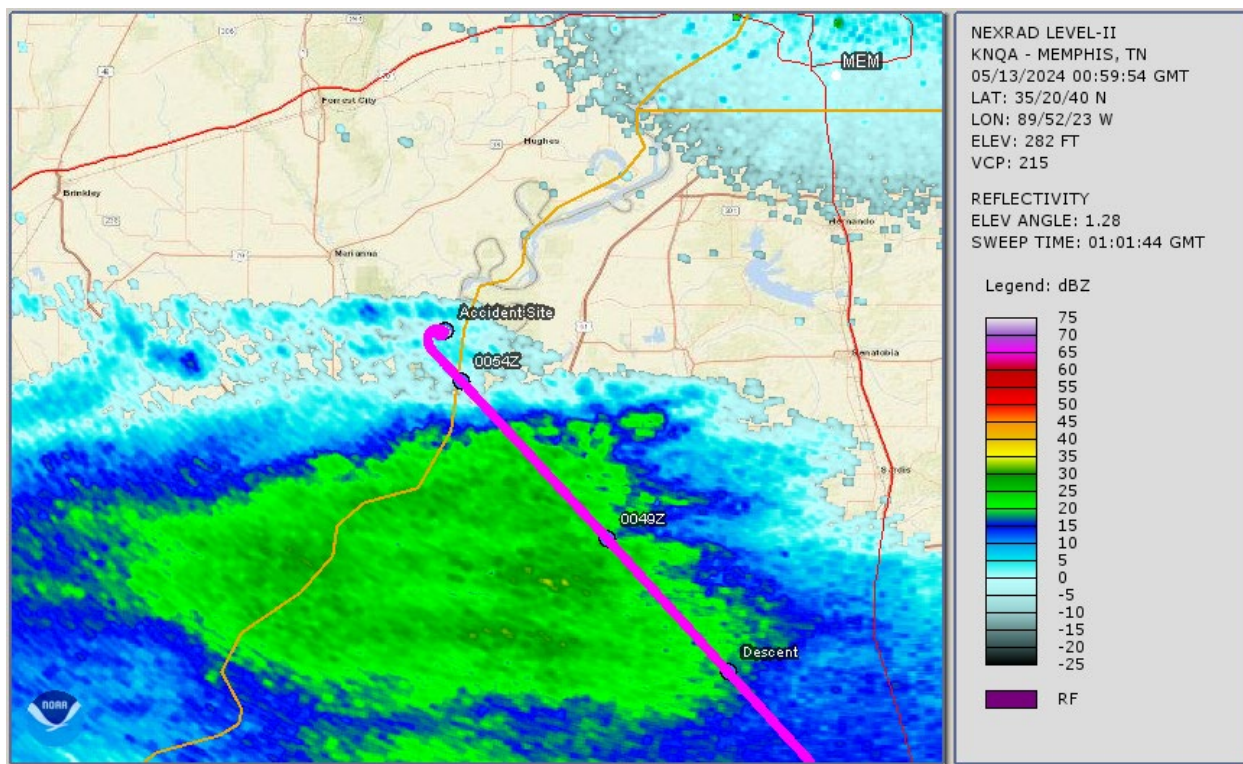


Figure 10 - KNQA WSR-88D 1.28° base reflectivity image for 1959 CDT with track.

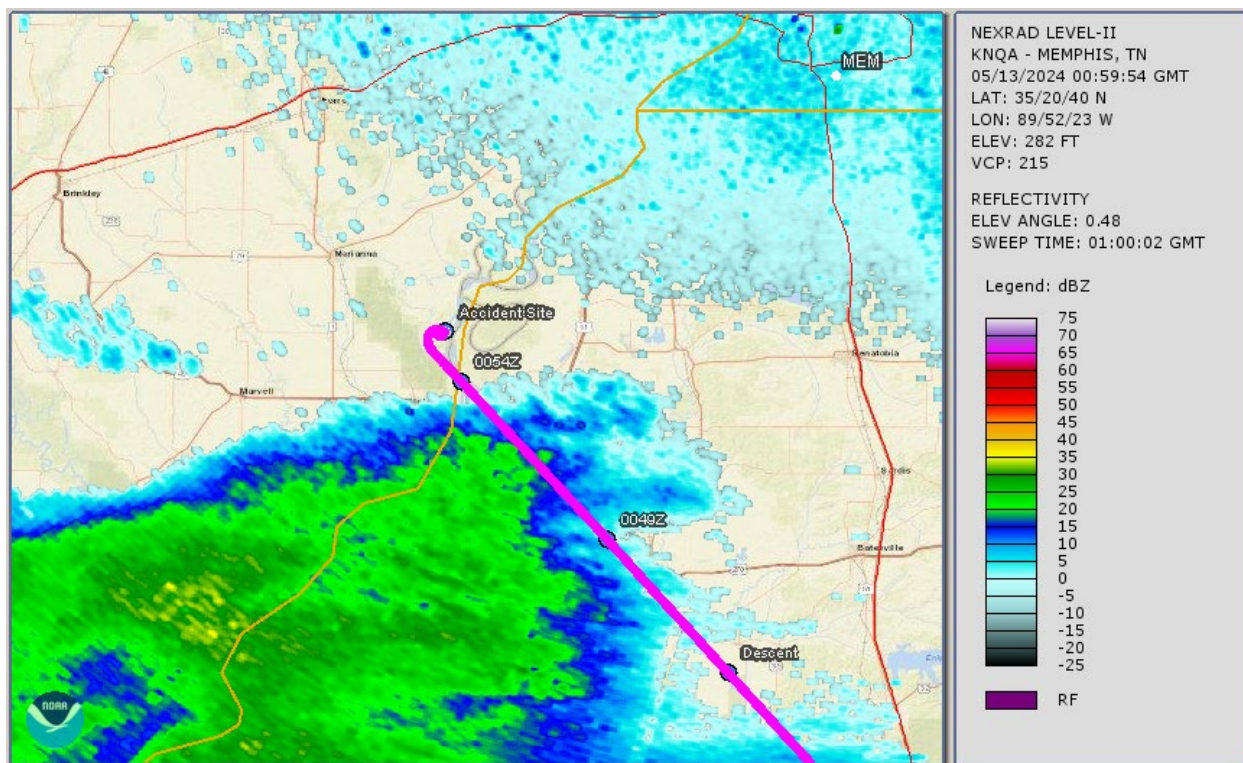


Figure 11 - KNOX WSR-88D 0.5° base reflectivity image for 1959 CDT with track.

6.0 Pilot Reports

The following pilot reports or PIREPs were disseminated longline¹¹ within 100 miles of KUTA between the period 2000 through 2300 CDT. The reports are in standard code and abbreviations, with time referenced to UTC.

GWO UA /OV SQS045030/TM 0008/FL240/TP F900/TB LGT-MOD CHOP/RM ZME

HOT UA /OV HOT225015/TM 0140/FL190/TP BE36/TA M06/IC LGT RIME 190-150/RM ZME

GWO UA /OV SQS360050/TM 0200/FL210/TP PC12/TA M12/IC LGT RIME 160-210/RM ZME

DYR UA /OV DYR090030/TM 0326/FL320/TP 320/TB CONS LGT OCNL MOD CHOP/RM ZME

Of the four PIREPs in the database, two reported light-to-moderate chop between FL240 and FL320, and the other two reported light rime type icing conditions between 15,000 through FL210.

¹¹ Includes only the reports official recorded and disseminated as a PIREP and may not include "ride reports" broadcasted or other conditions solicited by air traffic controllers and not entered in the formal PIREP format coding. These reports are available to users in near real-time.

7.0 NWS Forecasts

7.1 Graphic Area Forecast

The NWS Graphic Forecast for Aviation (GFA) is a graphical depiction of surface wind, thunderstorms, precipitation, color-coded general flight categories, and cloud cover bases and tops reported in msl heights, from graphical output from the NWS National Digital Forecast Database (NDFD) with the Graphic-Airmen's Meteorological Information (G-AIRMET) for IFR conditions, mountain obscuration, icing conditions, and strong surface wind overlaid. The GFA provides a forecast for the enroute phase of flight and for locations without a TAF, such as in this case at KUTA. The GFA is available at the NWS AWC website and through other weather briefing services. Figures 12 and 13 are the GFA 3-hour surface and cloud forecasts valid for 1900 CDT, and figures 14 and 15 the GFA 6-hour forecasts valid for 2200 CDT. The surface forecast depicted southerly winds at 10 to 15 knots with a large area of precipitation to the south in the form of rain showers and thunderstorms. A G-AIRMET for IFR conditions was depicted over southern Arkansas and most of all of Louisiana during the period. The cloud forecasts depicted a broken layers of clouds with bases near 7,000 ft with tops between 35,000 ft and 39,000 ft with higher cirrus clouds above.

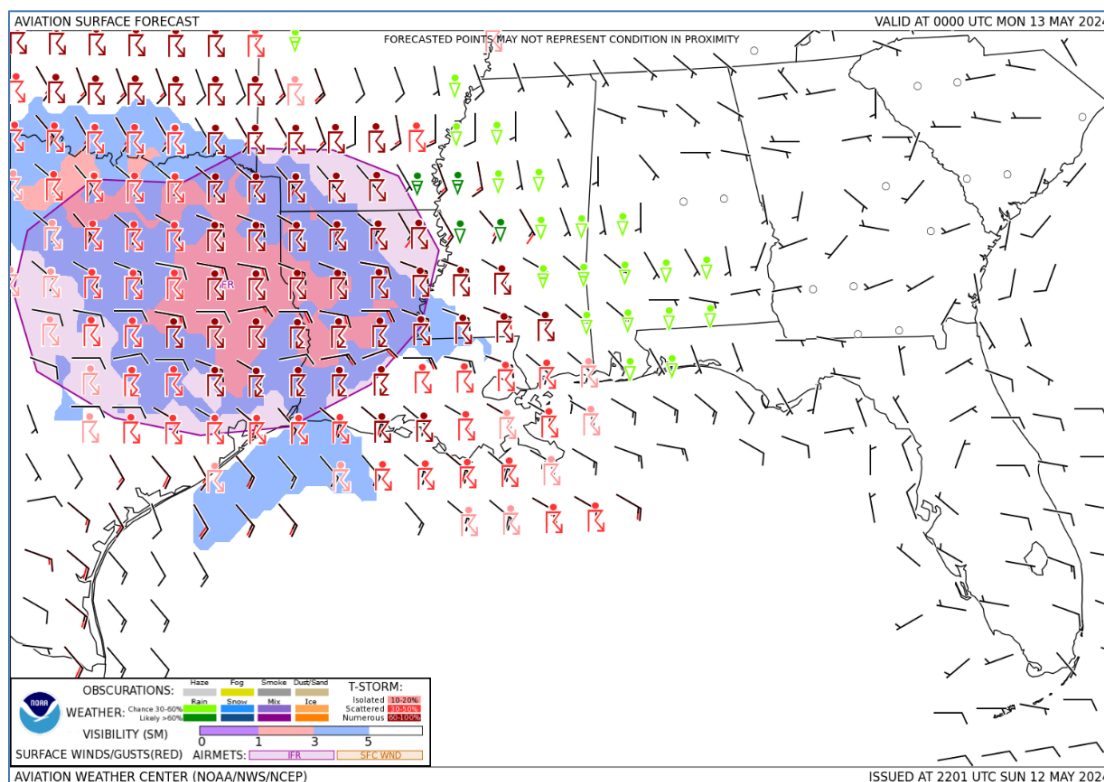


Figure 12 - NWS Graphic Forecast for Aviation (GFA) 3-hour Surface Forecast valid for 1900 CDT.

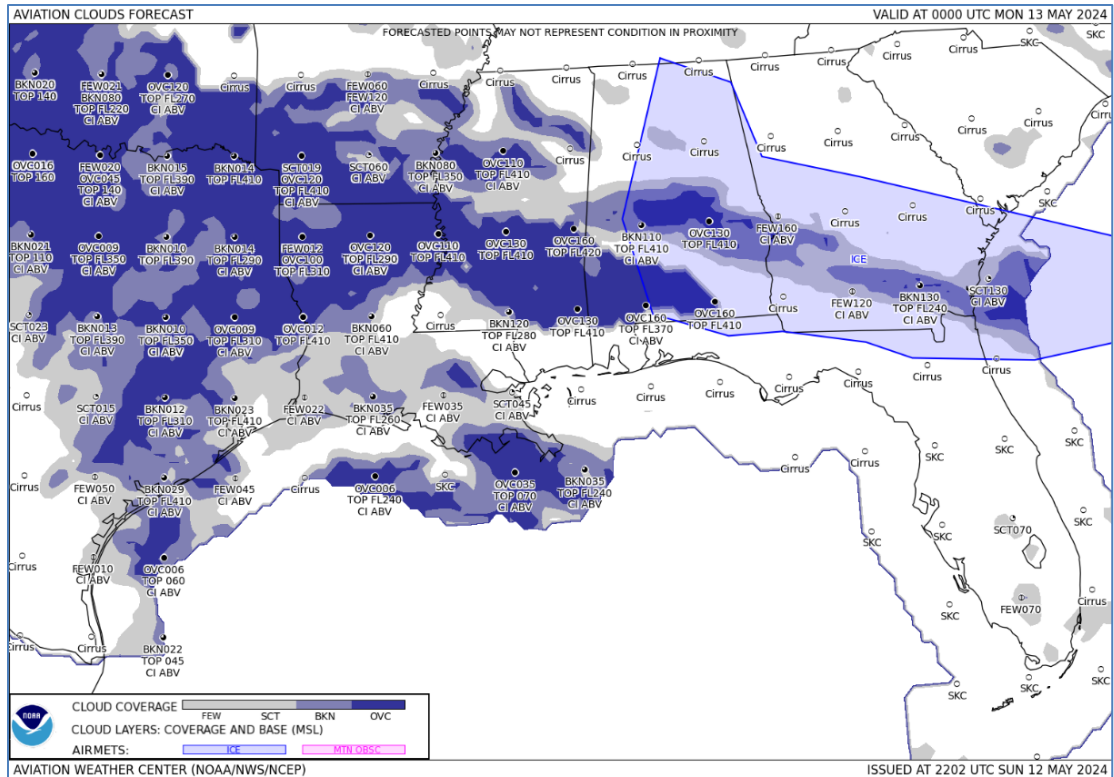


Figure 13 - NWS Graphic Forecast for Aviation (GFA) 3-hour Cloud Forecast valid for 1900 CDT.

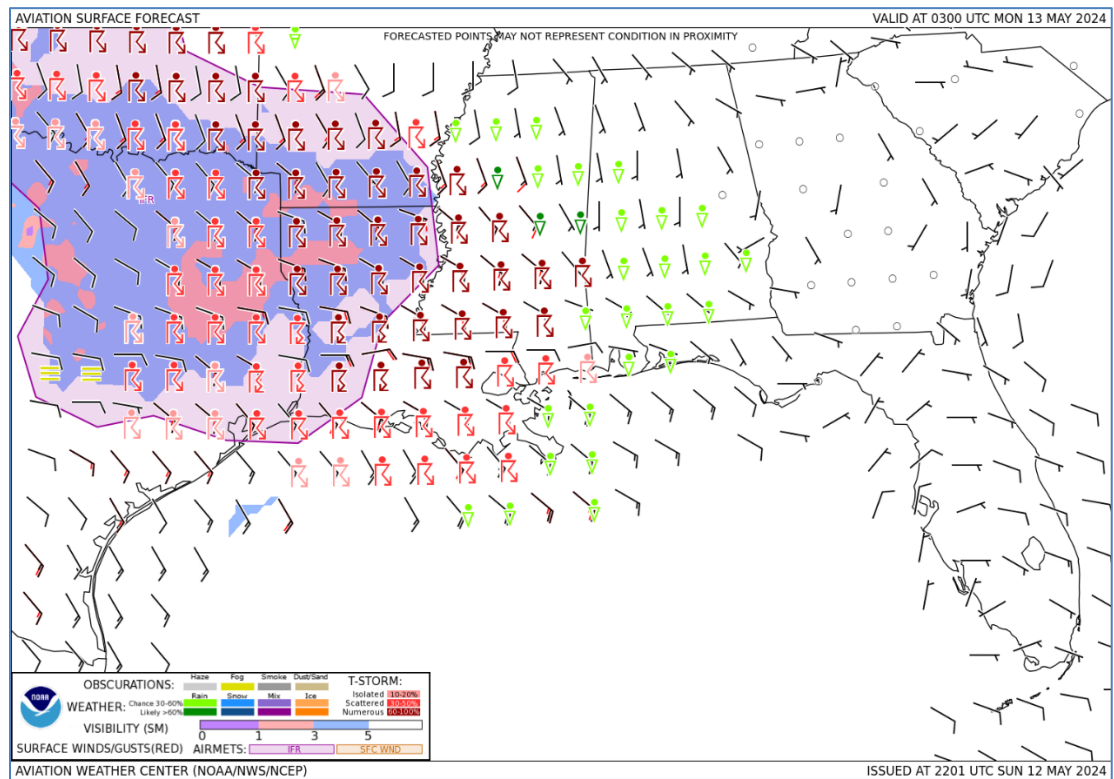


Figure 14 - NWS Graphic Forecast for Aviation (GFA) 6-hour Cloud Forecast valid for 2200 CDT.

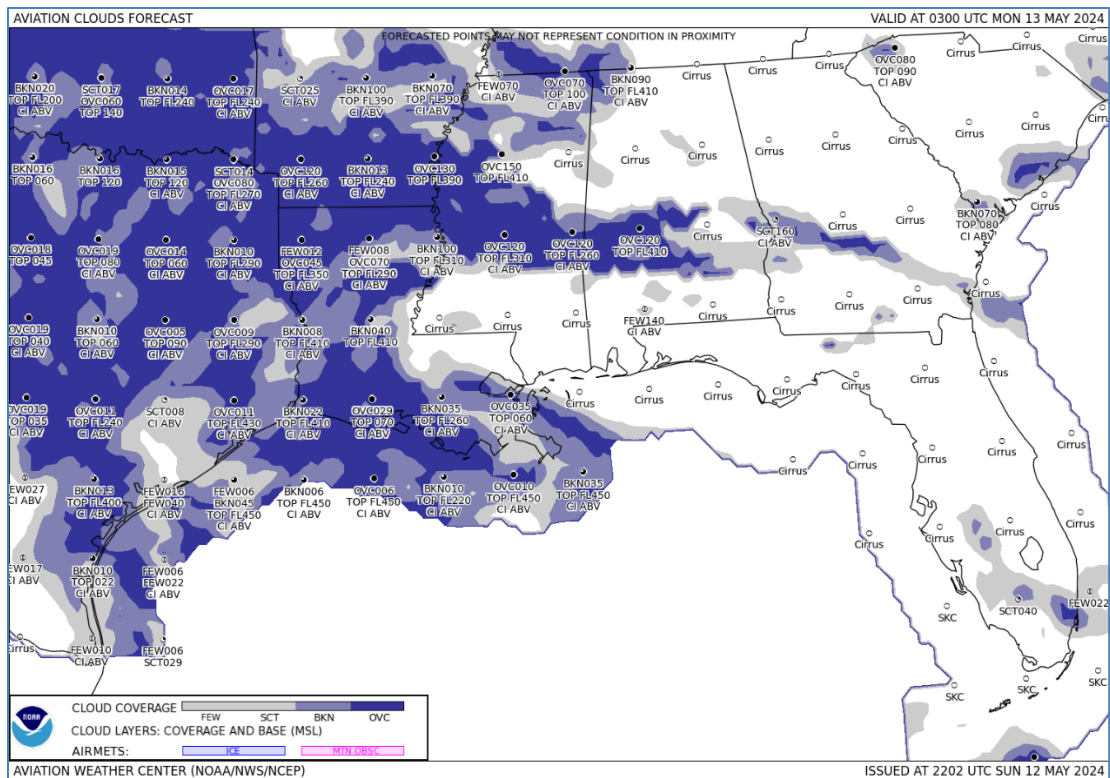


Figure 15 - NWS Graphic Forecast for Aviation 6-hour Cloud Forecast valid for 2200 CDT.

7.2 Winds and Temperature Aloft Forecast

The NWS Winds and Temperatures Aloft Forecast valid for the period along the general route of flight is included below based on the FBUS forecast bulletin.

FBUS31 KWN0 121957
 FD1US1
 -DATA BASED ON 121800Z
 VALID 130000Z FOR USE 2000-0300Z. TEMPS NEG ABV 24000

FT	3000	6000	9000	12000	18000	24000	30000	34000	39000
-PFN	9900	9900+14	2716+10	2825+05	2753-09	2850-20	285835	298346	298858
-MGM	9900	9900+12	2909+07	2829+02	2836-11	2853-20	275736	287847	289059
-BHM	9900	9900+10	2807+06	2819+01	2828-11	2948-22	276537	287647	289560
-JAN	1715	2213+12	2212+07	2211+00	2312-10	2431-19	276836	277246	277159
-LIT	1718	1717+11	1913+06	2611+02	2725-11	2568-21	257836	267647	257059
-MEM	1913	1710+10	9900+05	2411+00	2615-12	2840-21	269136	269547	268959

A graphic representative of the NWS AWC's winds aloft chart for FL270 is included as figure 16. The chart depicted the winds near the accident airplane's cruising level.

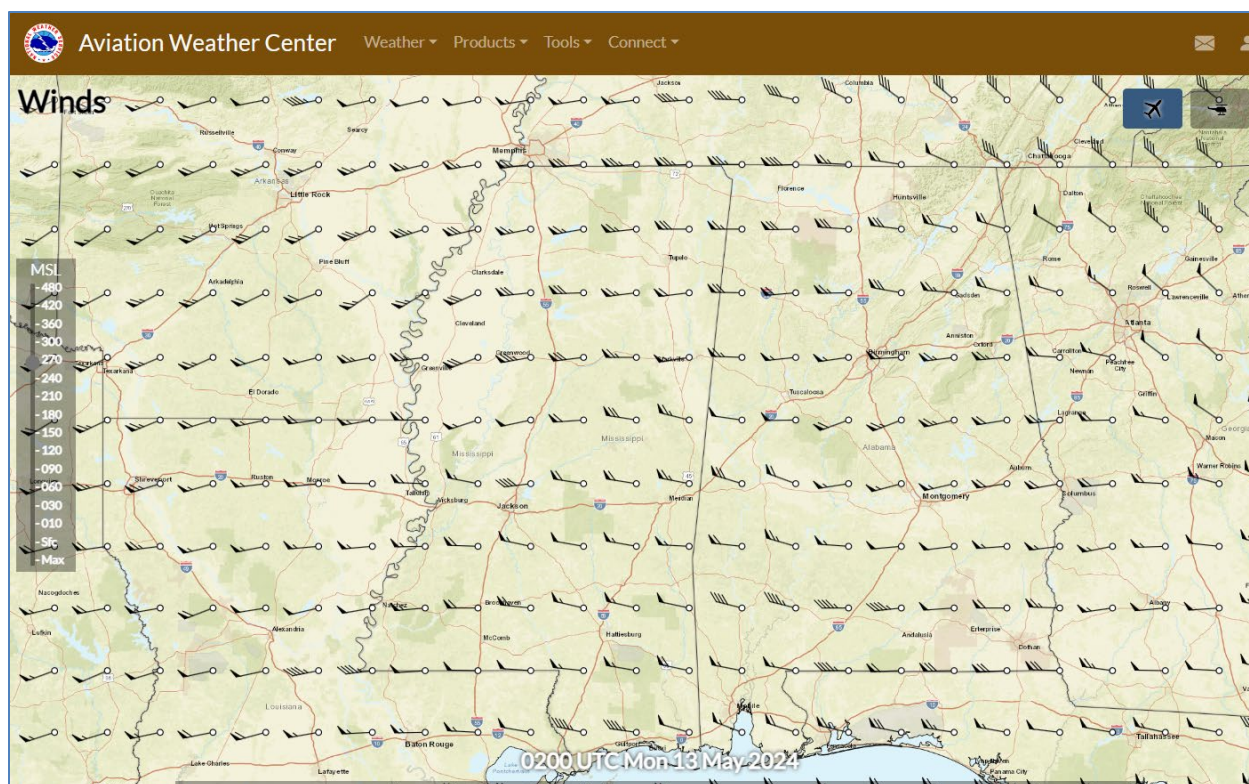


Figure 16 - NWS Winds Aloft Forecast valid for 2100 CDT for 27,000 ft.

7.3 Graphic Turbulence Guidance

The NWS Graphic Turbulence Guidance (GTG) for turbulence potential at FL240 for 2000 CDT is included as figure 17. The chart depicted a Graphic-AIRMET that was issued at 1545 CDT and was valid until 1900 CDT and current over the accident site for occasional moderate turbulence between FL210 and FL410. A Convective SIGMET was depicted for thunderstorms over southern Arkansas and Mississippi, and Louisiana, which was expected to move eastward with time. The GTG forecast for 2100 CDT is included as figure 18, which showed the G-AIRMET shrinking in coverage and north of the accident site and the Convective SIGMET remaining in place south of the area.

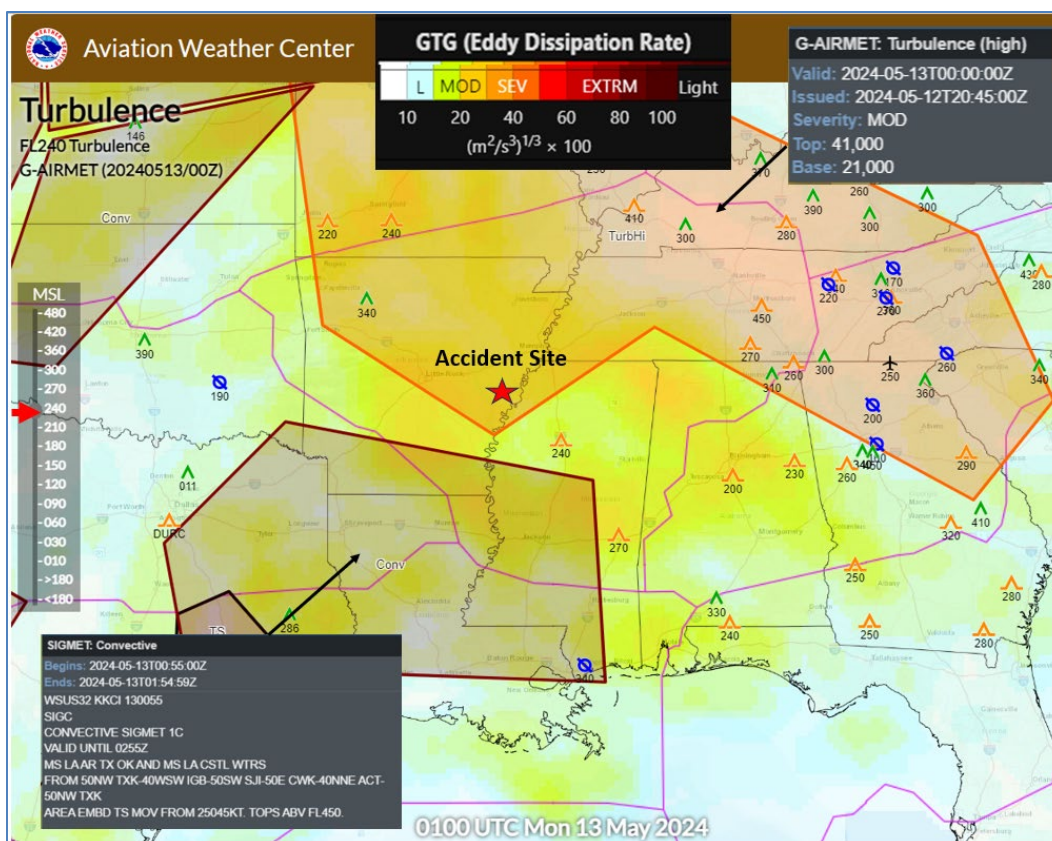


Figure 17 - NWS AWC's Graphic Turbulence Graphic for FL240 at 2000 CDT with Graphic-AIRMET for turbulence current immediately north of the accident site between FL210-FL410.

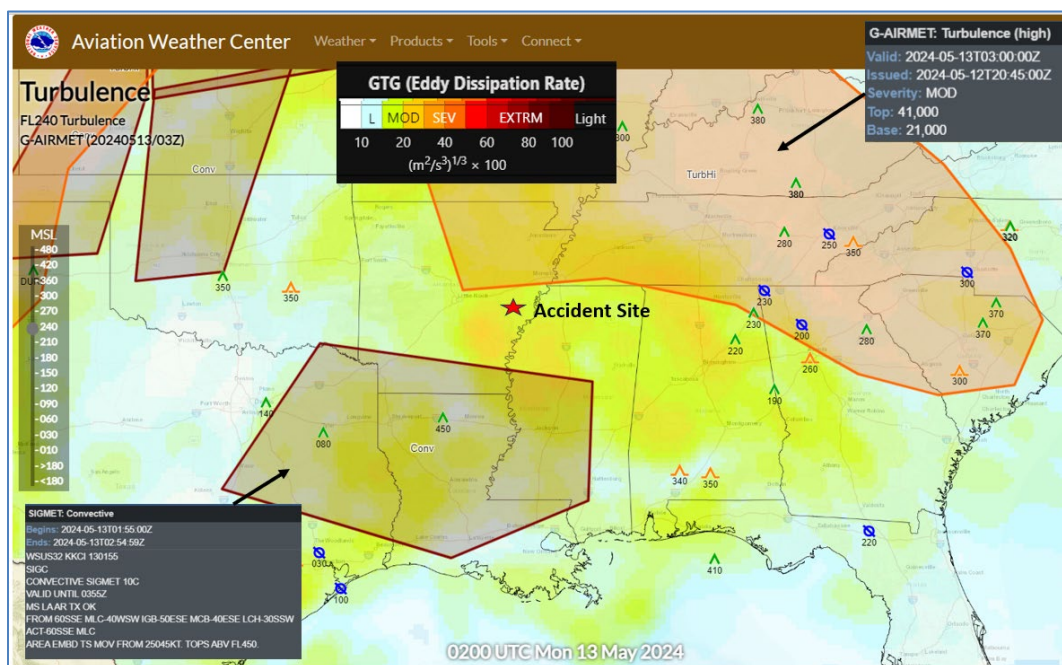


Figure 18 - NWS AWC's Graphic Turbulence Graphic for FL240 at 2100 CDT with Graphic-AIRMET for turbulence current immediately north of the accident site between FL210-FL410.

8.0 Inflight Weather Advisories

In-flight Aviation Weather Advisories are forecasts that advise en route aircraft of the development of potentially hazardous weather. Inflight aviation weather advisories in the conterminous U.S. are issued by the NWS AWC, as well as from the Center Weather Service Units (CWSU) at the various Air Route Traffic Control Centers (ARTCCs). There are four basic types of inflight aviation weather advisories: the Significant Meteorological Information (SIGMET), the Convective SIGMET, the Graphic-AIRMET, and the Center Weather Advisory (CWA). Inflight advisories serve to notify en-route pilots of the possibility of encountering hazardous flying conditions that may not have been forecast at the time of the preflight briefing. Whether or not the condition described is potentially hazardous to a particular flight is for the pilot to evaluate based on experience and the operational limits of the aircraft. Once issued they are broadcast by FAA air traffic controllers upon issuance and available on inflight weather broadcasts.

At the time of the accident, the NWS had no SIGMETs, Convective SIGMETs, or CWA's current over the accident site. The NWS did have a G-AIRMET current over the area for occasional moderate turbulence between FL210 and FL410. No advisories were current for icing over the area.

9.0 Astronomical Conditions

The United States Naval Observatory's website provided the following astronomical conditions over the accident site on the day of the accident.

<u>Sun</u>	<u>Time (CDT)</u>
Begin civil twilight	0534
Sunrise	0601
Sunset	1956
End civil twilight	2024
Accident	2058
<u>Moon</u>	<u>Time</u>
Moonset	0010
Moonrise	0944
Upper transit	1723
Accident	2058
Moonset	0056 CDT May 13, 2024

At the time of the accident the sun was more than 12° below the horizon and the moon was 44° above the horizon at an azimuth of 274°. The phase of the moon was a waxing crescent with 27% of the moon's disk illuminated.

Submitted by:

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