



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

February 15, 2022

Specialist's Factual Report

METEOROLOGY

ERA22FA014

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A. ACCIDENT

Location: Blairsville, Georgia
Date: October 13, 2021
Time: 0816 eastern daylight time
1216 Coordinated Universal Time (UTC)
Airplane: Piper PA-24-260; Registration: N9126P

B. METEOROLOGIST

Paul Suffern
Senior Meteorologist
Operational Factors Division (AS-30)
National Transportation Safety Board

C. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's (NTSB) Meteorologist did not travel for this investigation and gathered the weather data for this investigation from official National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) sources and also from the National Centers for Environmental Information (NCEI). This Specialist's Factual Report contains the meteorological factors pertinent to the weather surrounding the accident time. All times are eastern daylight time (EDT) and are based upon the 24-hour clock, where local time is - 4 hours from UTC. Directions are referenced to true north and distances are in nautical miles. Heights are above mean sea level (msl) unless otherwise noted. Visibility is in statute miles and fractions of statute miles. 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. airports.

The accident site was located at latitude 34.88107° N, Longitude 83.99402° W, at an approximate elevation of 1,800 feet (ft).

D. FACTUAL INFORMATION

1.0 Synoptic Situation

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 and the Weather Prediction Center, located in College Park, Maryland. These are the base products used in describing synoptic weather features and in the creation of forecasts and warnings for the NWS. Reference to these charts can be found in the joint NWS and Federal Aviation Administration (FAA) Advisory Circular "Aviation Weather Services", AC 00-45H.¹

¹

https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1030

1.1 Surface Analysis Chart

The NWS Surface Analysis Chart centered over the southeastern United States for 0800 EDT is provided as figure 1 with the location of the accident site within the red circle. The chart depicted a warm front stretching from Kansas eastward through Tennessee and Kentucky. A high-pressure system with pressure of 1019-hectopascals (hPa) was located just south of the accident site in northwestern Georgia. The accident site was located south of the warm front in an area of light and variable surface winds.

The station models around the accident site depicted air temperatures in the mid 60's degrees Fahrenheit (°F), dew point temperatures in the low to mid 60's °F with temperature-dew point spreads of 2°F or less, mostly cloudy skies, mist, and sky obscured noted at several of the station models.

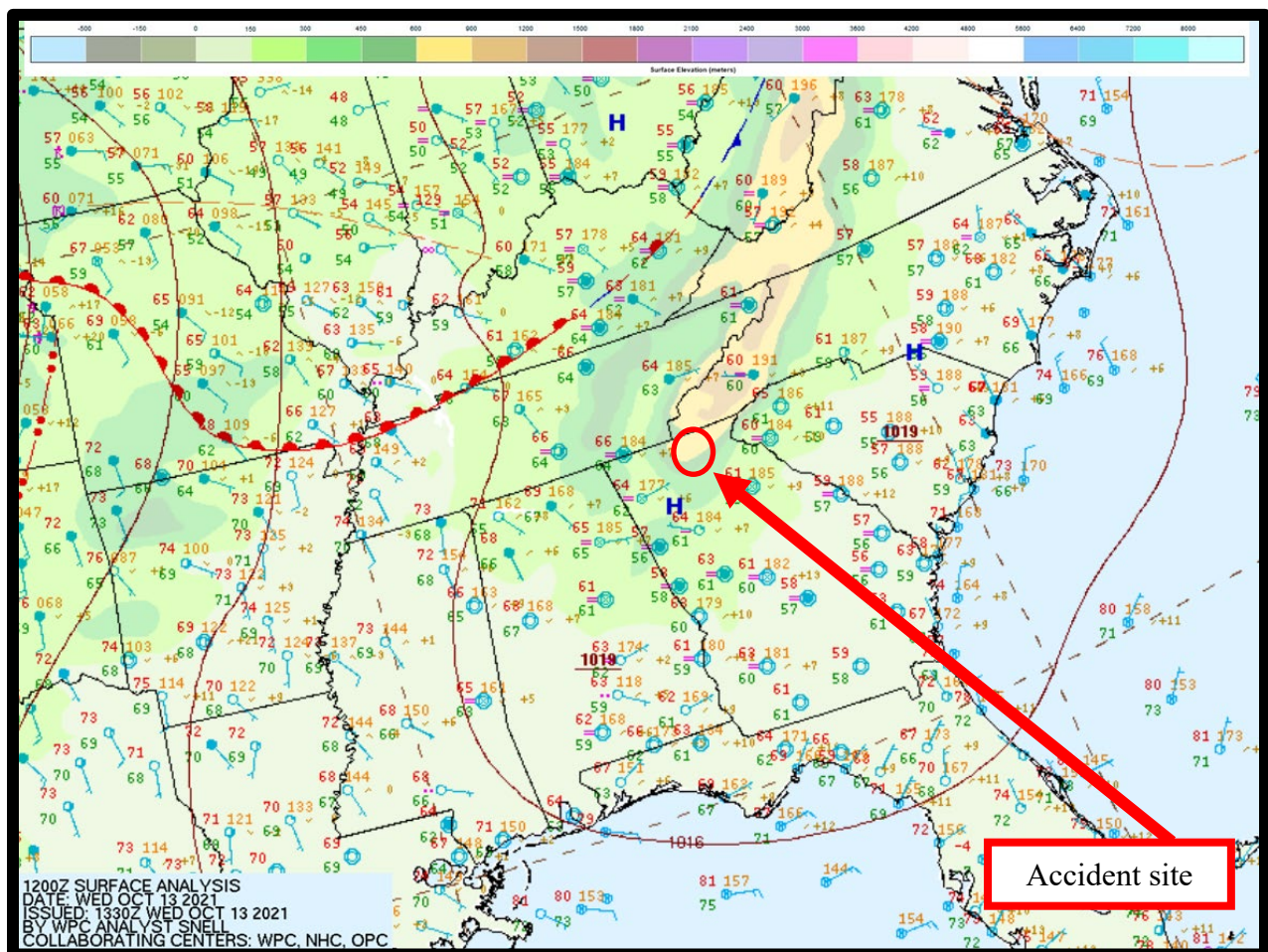


Figure 1 – NWS Surface Analysis Chart for 0800 EDT.

2.0 Surface Observations

The area surrounding the accident site was documented using official Aviation Routine Weather Reports (METARs) and Specials (SPECIs). The following observations were taken from standard code and are provided in plain language. Figure 2 is a local sectional chart with the accident site and the closest weather reporting location marked.



Figure 2 – Sectional map of the accident area with the locations of the accident site and surface observation site.

Blairsville Airport (KDZJ) was the departure airport and also had the closest official weather station to the accident site. KDZJ had an Automated Weather Observing System (AWOS²) whose longline³ reports were not augmented. The KDZJ AWOS was located 2 miles south of the accident site, at an elevation of 1,907 ft, and had a 6° westerly magnetic variation⁴ (figure 2). KDZJ AWOS observations surrounding the accident time are shown below:⁵

² AWOS – Automated Weather Observing System is equipped with meteorological instruments to observe and report temperature, dewpoint, wind speed and direction, visibility, cloud coverage and ceiling up to 12,000 feet, and altimeter setting. AWOS are maintained by the FAA.

³ “Longline” refers to the dissemination of weather observations with the intent that they are available in near-real time to national databases (effectively, the whole world) and accessible to the general global public from a large number of vendors. This does not include public accessibility to observations from a reporting station’s Very High Frequency (VHF; line-of-site) or telephone broadcast, where applicable. Longline dissemination of weather observations is the primary vehicle through which the general global public has access to surface weather observations, particularly outside of the aviation community.

⁴ Magnetic variation – The angle (at a particular location) between magnetic north and true north. Latest measurement taken from <https://skyvector.com/>

⁵ The bold sections in this NWS product and the rest of the products in this report are intended to highlight the text that directly reference the weather conditions that affected the accident location around the accident time. The local times in this section next to the METARs are provided for quick reference between UTC and local times around the

[0655 EDT] METAR KDZJ 131055Z AUTO 00000KT 1/4SM FG OVC002 14/ A3014 RMK
AO2 T0138////

[0715 EDT] METAR KDZJ 131115Z AUTO 00000KT 1/4SM FG OVC002 14/ A3015 RMK
AO2 T0138////

[0735 EDT] METAR KDZJ 131135Z AUTO 00000KT M1/4SM FG OVC002 14/ A3015 RMK
AO2 T0137////

[0755 EDT] METARKDZJ 131155Z AUTO 00000KT M1/4SM FG OVC002 13/ A3016 RMK
AO2 T0135//// 10147 20135 60001 70001

***[0815 EDT] METAR KDZJ 131215Z AUTO 10003KT M1/4SM FG OVC002 14/ A3016 RMK
AO2 T0135////***

ACCIDENT TIME 0816 EDT

***[0835 EDT] METAR KDZJ 131235Z AUTO 00000KT 1/4SM FG OVC002 14/ A3017 RMK
AO2 T0135////***

[0855 EDT] METAR KDZJ 131255Z AUTO 00000KT 1/4SM FG OVC002 14/ A3017 RMK
AO2 T0136////

The bold type observations decoded in plain language were as follows:

KDZJ weather at 0815 EDT, automated, wind from 100° at 3 knots, visibility less than a quarter mile, fog, overcast ceiling at 200 ft above ground level (agl), temperature of 14° Celsius (C), and an altimeter setting of 30.16 inches of mercury (inHg). Remarks, station with a precipitation discriminator, temperature 13.5°C.

KDZJ weather at 0835 EDT, automated, wind calm, visibility of a quarter mile, fog, overcast ceiling at 200 ft agl, temperature of 14°C, and an altimeter setting of 30.17 inHg. Remarks, station with a precipitation discriminator, temperature 13.5°C.

accident time.

The observations from KDZJ surrounding the accident time indicated LIFR⁶ conditions in fog.⁷

3.0 Upper Air Sounding

A High-Resolution Rapid Refresh (HRRR)⁸ model sounding was created for the accident site for 0800 EDT which provided a surface elevation of 1,867 ft.⁹ The 0800 EDT HRRR sounding was plotted on a standard Skew-T Log P diagram¹⁰ with the derived stability parameters included in figure 3 with data from the surface to 700-hPa (or approximately 10,000 ft above msl). These data were analyzed using the RAOB¹¹ software package. The sounding depicted the lifted condensation level (LCL)¹² at 297 ft agl (2,164 ft above msl) and the convective condensation level (CCL)¹³ at 11,250 ft above msl. The freezing level was located at 16,635 ft above msl. The precipitable water value was 0.80 inches.

⁶ As defined by the NWS and the FAA Aeronautical Information Manual (AIM) section 7-1-7 defines the following general flight categories:

- Low Instrument Flight Rules (LIFR*) – ceiling below 500 ft above ground level (agl) and/or visibility less than 1 statute mile.
- Instrument Flight Rules (IFR) – ceiling between 500 to below 1,000 feet agl and/or visibility 1 to less than 3 miles.
- Marginal Visual Flight Rules (MVFR**) – ceiling from 1,000 to 3,000 ft agl and/or visibility 3 to 5 miles.
- Visual Flight Rules (VFR) – ceiling greater 3,000 ft agl and visibility greater than 5 miles.

* By definition, IFR is a ceiling less than 1,000 ft agl and/or visibility less than 3 miles while LIFR is a sub-category of IFR.

**By definition, VFR is a ceiling greater than or equal to 3,000 ft agl and visibility greater than 5 miles while MVFR is a sub-category of VFR.

⁷ The dew point temperature data was unavailable from KDZJ METAR.

⁸ The HRRR is a NOAA real-time three-kilometer resolution, hourly-updated, cloud-resolving, convection-allowing atmospheric model, initialized by three-kilometer grids with three-kilometer radar assimilation. Radar data is assimilated in the HRRR every 15 minutes over a one-hour period.

⁹ HRRR sounding was created using NOAA Air Resource Laboratory: <https://ready.arl.noaa.gov/READYamet.php>

¹⁰ Skew T log P diagram – is a standard meteorological plot 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.

¹¹ RAOB – (The complete Rawinsonde Observation program) is an interactive sounding analysis program developed by Eosonde Research Services, The Villages, Florida.

¹² LCL - The height at which a parcel of moist air becomes saturated when it is lifted dry adiabatically.

¹³ CCL – The level in the atmosphere to which an air parcel, if heated from below, will rise dry adiabatically, without becoming colder than its environment just before the parcel becomes saturated.

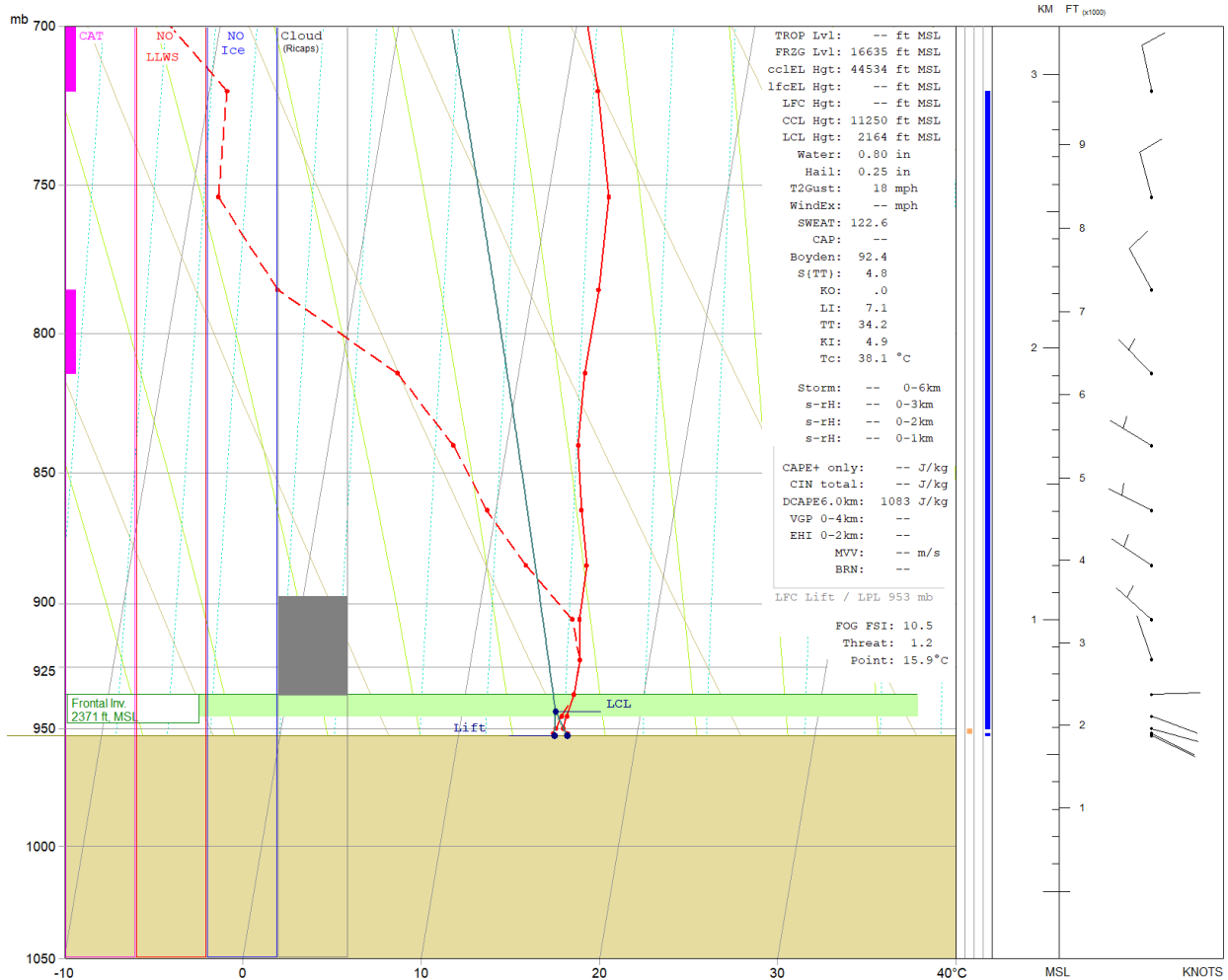


Figure 3 – 0800 EDT HRRR sounding.

The 0800 EDT HRRR sounding for the accident site indicated a stable environment from the surface through 10,000 ft above msl. Clouds were indicated by RAOB to be present from 2,400 ft above msl (~500 ft agl) through 4,000 ft above msl. A frontal inversion¹⁴ was noted at 2,371 ft above msl. No icing potential was indicated by RAOB below 10,000 ft above msl.

The 0800 EDT HRRR sounding wind profile indicated a near surface wind from 117° at 1 knot with the wind remaining light and variable at 5 knots or less below 7,000 ft above msl. RAOB did not indicate the possibility of low-level wind shear (LLWS) or clear-air turbulence below 6,000 ft above msl.

¹⁴ Inversion – A departure from the usual decrease of the value of an atmospheric property with increasing altitude; also, the layer through which this departure occurs (the "inversion layer"), or the lowest altitude at which the departure is found (the "base of the inversion").

4.0 Satellite Data

The Geostationary Operational Environmental Satellite number 16 (GOES-16) visible and infrared data were obtained from an archive at the Space Science Engineering Center at the University of Wisconsin-Madison in Madison, Wisconsin, and processed using the Man-computer Interactive Data Access System software. Visible and infrared imagery (GOES-16 bands 2 and 13) at wavelengths of 0.64 microns (μm) and 10.3 μm , respectively, were retrieved for the period from 0600 EDT through 1200 EDT and reviewed, and the closest images to the time of the accident were documented.

Figure 4 presents the GOES-16 visible imagery from 0820 EDT at 2X magnification with the accident site highlighted with a red square. There was cloud cover above the accident site and in the valleys across the mountainous terrain of northern Georgia, western North Carolina, and eastern Tennessee. Figure 5 presents the GOES-16 infrared imagery from 0820 EDT at 6X magnification with the accident site highlighted with a red square. The lower brightness temperatures (red and yellow colors; higher cloud tops) were located northwest of the accident site in Tennessee. The brightness temperature of about 285 Kelvin above the accident site would have been near 6,000 ft based on the vertical temperature profile provided by the 0800 EDT HRRR sounding. It should be noted these figures have not been corrected for any parallax error.

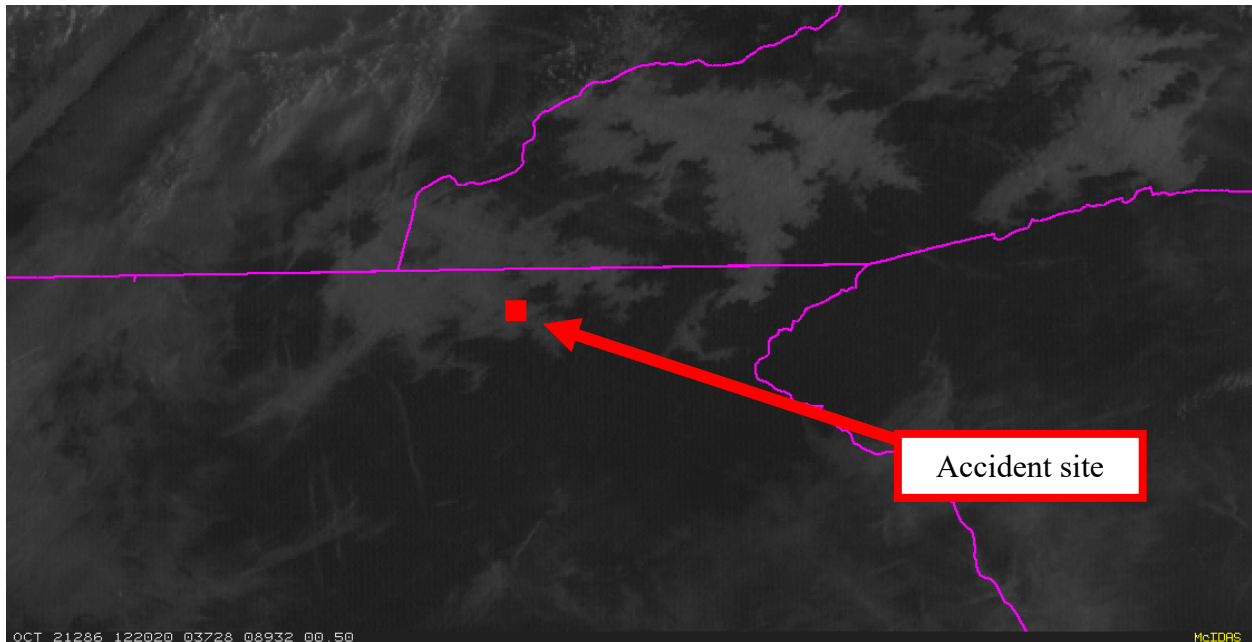


Figure 4 – GOES-16 visible image at 0820 EDT.

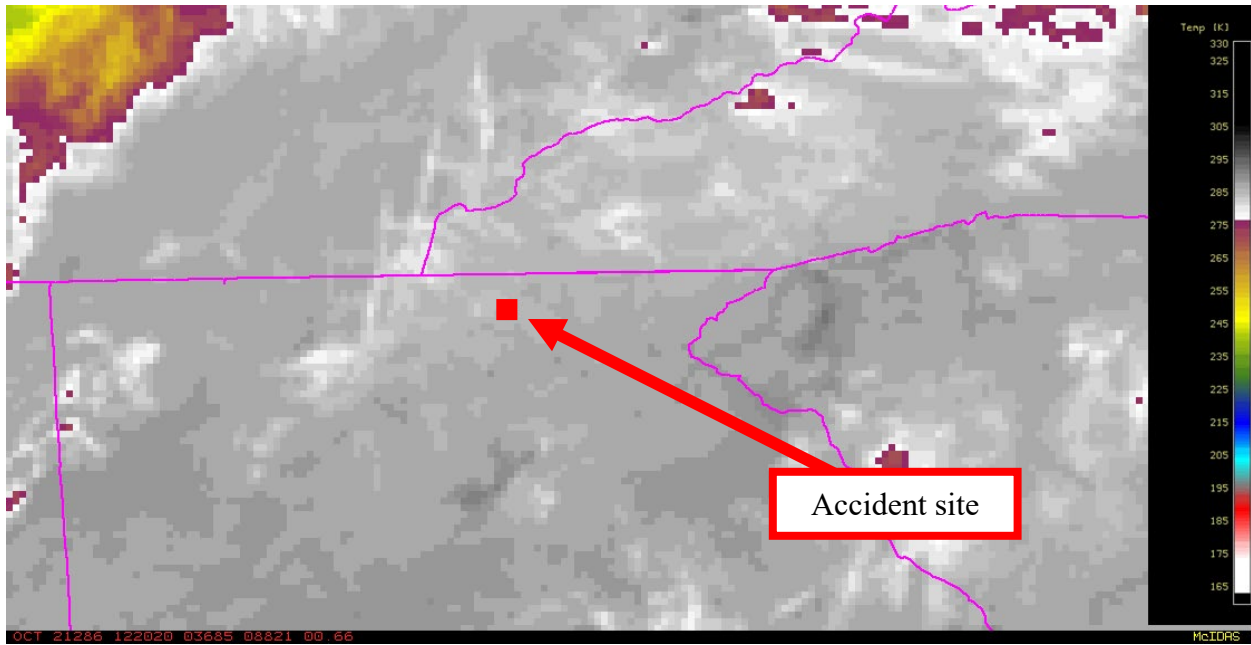


Figure 5 – GOES-16 infrared image at 0820 EDT.

5.0 Regional Radar Imagery Information

A regional view of the NWS National Reflectivity Mosaic is included as figure 6 for 0815 EDT with the approximate location of the accident site marked by a red circle. The image depicted no echoes above the accident site at the accident time.

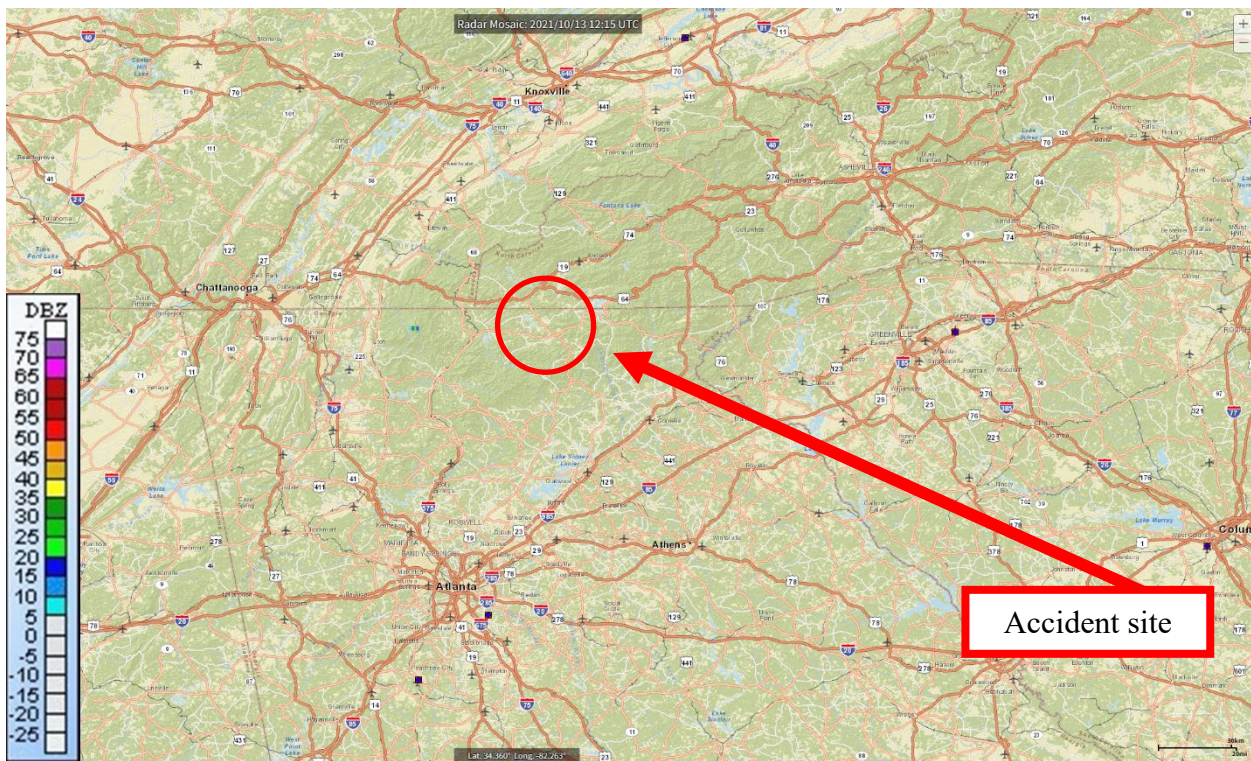


Figure 6 – National Reflectivity Mosaic for 0815 EDT.

6.0 Pilot Reports

The longline-disseminated pilot reports¹⁵ (PIREPs) distributed into the national airspace (NAS) were reviewed from about two hours prior to the accident time to two hours after the accident time and the PIREPs within 100 miles of the accident site below 18,000 ft above msl are shown below:

TYS UA /OV 1 NE TYS/TM 1007/FL015/TP A306/SK BASES 600 AGL

AVL UA /OV AVL350001/TM 1037/FL024/TP CRJ9/SK BKN024-TOP034/RM DURC

TYS UA /OV TYS270010/TM 1045/FL057/TP CRJ9/SK B006 T057

ATL UA /OV RYY/TM 1110/FLDURGD/TP BE20/SK OVC002/WX 3/4SM

ATL UA /OV FTY/TM 1118/FLDURGC/TP BE40/SK OVC002 T BKN004

TYS UA /OV SHORT FINAL RWY 23L/TM 1143/FL1800/TP C68A/RM BASES 1800

RYY UA /OV KRY00000/TM 1210/FLDURC/TP C525/SK OVC001/RM TOPS 200AGL

TYS UA /OV TYS/TM 1332/FLDURGD/TP B712/RM BASES 2300

7.0 Significant Meteorological Information

There were no non-convective or convective Significant Meteorological Information (SIGMET) advisories valid for the accident site at the accident time.

8.0 Center Weather Service Advisories

The Atlanta (ZTL) Air Route Traffic Control Center (ARTCC) Center Weather Service Unit (CWSU) was responsible for the accident region. ZTL CWSU issued Center Weather Advisory (CWA) 102 at 0727 EDT which was valid at the accident time. CWA 102 warned of patchy LIFR ceilings and visibilities in fog and mist with conditions expected to improve by the end of the period (1000 EDT):

FAUS21 KZTL 131127

ZTL1 CWA 131126

ZTL CWA 102 VALID UNTIL 131400

FROM PSK-GSO-35WNW AMG-40S MSL-65E BNA-PSK

AREA PTCHY LIFR CIGS BLW 005 AND VIS BLW 1/2SM IN FG/BR. EXP CONDS

TO IMPRV BYD END OF PD. VA NC SC GA AL TN

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¹⁵ Only pilot reports with the World Meteorological Organization headers UBTN**, UBNC**, UBSC**, UBGA**, and UBAL** were considered. These do not include pilot reports only broadcast via radio.

9.0 Airmen's Meteorological Information

There was Airmen's Meteorological Information (AIRMET) advisory Sierra valid for the accident site at the accident time. AIRMET Sierra issued at 0445 EDT forecast IFR conditions through 1100 EDT:

WAUS42 KKCI 130845
WA2S
-MIAS WA 130845
AIRMET SIERRA UPDT 2 FOR IFR VALID UNTIL 131500

.
AIRMET IFR...FL AND CSTL WTRS
FROM 30NNW CRG TO 40WSW TRV TO 20E SRQ TO 20ENE CTY TO 30NNW CRG
CIG BLW 010/VIS BLW 3SM BR. CONDS ENDG 12-15Z.

.
AIRMET IFR...NC SC GA FL AND CSTL WTRS
FROM 20NE ECG TO 60E ECG TO 90SSE ECG TO 40W ILM TO 20WSW CHS TO
30SW SAV TO 50SSE CEW TO 50SE SJI TO 40W CEW TO 50SW PZD TO GQO
TO HNV TO 20NE ECG
CIG BLW 010/VIS BLW 3SM BR. CONDS CONTG BYD 15Z ENDG 15-18Z.

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10.0 Graphical Forecasts for Aviation

The Graphical Forecasts for Aviation (GFA) products issued before the accident flight and valid at 0800 EDT are shown in attachment 1. The GFA surface forecast applicable to the accident region that was valid before the accident flight's departure for times surrounding the accident time indicated LIFR surface visibilities with fog, and a calm surface wind. The GFA cloud forecast applicable to the accident region that was valid before departure for times surrounding the accident time indicated cirrus clouds above the accident site with lower cloud cover indicated in northwestern Georgia and southeastern Tennessee. The Graphical AIRMET¹⁶ (G-AIRMET) Sierra for IFR conditions was overlaid on the GFA surface forecast imagery. The only human-generated information reflected in the two GFA products were the G-AIRMETs. For more information, please see attachment 1.

11.0 Terminal Aerodrome Forecast

There were no sites within 30 miles of the accident site or the accident flight's departure location with an NWS Terminal Aerodrome Forecast (TAF).¹⁷

12.0 NWS Area Forecast Discussion

The NWS office in Peachtree City, Georgia, (WFO FFC) was responsible for the public forecast and TAFs in the region of the accident site. WFO FFC issued the following Area Forecast

¹⁶ <https://aviationweather.gov/gairmet>

¹⁷ According to NWS Instruction 10-813: "An NWS TAF consists of the expected meteorological conditions significant to aviation at an airport for a specified time period. For the U.S., this is the area within five (5) statute miles (SM) of the center of an airport's runway complex." www.nws.noaa.gov/directives/sym/pd01008013curr.pdf

Discussion at 0750 EDT with improving conditions expected by the early afternoon at most TAF sites:

FXUS62 KFFC 131150
AFDFFC

Area Forecast Discussion
National Weather Service Peachtree City GA
750 AM EDT Wed Oct 13 2021

...12Z Aviation Area Forecast Discussion...

.PREV DISCUSSION... /Issued 512 AM EDT Wed Oct 13 2021/

SHORT TERM /Today through Thursday/...

Biggest issue in the short term is ongoing development of fog across the CWA. Winds are light to calm, skies are clear and have been the past several hours, plenty of surface moisture is still in place leading to low to near zero dewpoint depressions, and a surface high is in place underneath mid-level ridging aiding in development of the inversion. Put it all together and you get decent overall chances of fog development. Initial development has been centered around rivers, lakes, and valleys especially in north GA, but is beginning to fill in elsewhere. Have issued SPS for patchy dense fog through 11 am and will monitor conditions for upgrade to full Dense Fog Advisory.

Expect fog to clear by early afternoon. Otherwise, surface high remains in place across the SE underneath upper level ridge. To our northwest, strong sfc low will continue to lift rapidly to the north over the upper Great Plains underneath strong PV anomaly rotating through the base of larger trough. Large trough remains anchored out west for now, so little in the way of progression of the cold front associated with the low is expected as it quickly loses any forcing. Surface high will remain anchored over the area, so tonight should be another night of potential fog development. Thursday afternoon looks much the same as today, with early afternoon clearing and development of some cumulus, but otherwise sunny and warm.

Highs remain above average for mid-October. Both days will be in the low to mid 80s which is as much as 10 degrees above average in north Georgia. Lows remain warm as well, in the 60s.

Lusk

LONG TERM /Thursday Night through Tuesday/...

Main initial influencing feature to the fest period will be with an upper longwave trough pushing a translated attendant cold front across the area for mainly late Friday into Saturday. Guidance is in pretty good consensus in the timing as the main increased pops should be in the Friday night period and the front should be

exiting the SE portion of the area by Saturday afternoon. While some shear parameters are increased with this system, the CAPE is quite limited so not expecting much in the way of strong/severe convection and have overall thunder mention at slight chance.

Strong ridging builds into the area in the post frontal regime and some of the coolest temps of the season will be on tap late Saturday into early next week and can expect overnight lows dipping into the mid to upper 40s for parts of the area (even low 40s in the far NE mtns).

Baker

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.AVIATION...

12Z Update...

Low vsbys remain around the area with most TAF sites at IFR or lower. The exception is KATL, which remains above the surrounding fog thus far. Could see a brief dip, but looking less and less like even MVFR vsbys are going to happen. All fog should burn off by early afternoon leaving potential for some SCT cu to develop later. Winds should be light and VRB at most sites through the day.

//ATL Confidence...12Z Update...

High confidence all elements.

Lusk

&&

.PRELIMINARY POINT TEMPS/POPS...

Athens	81	62	83	62	/	0	5	0	0
Atlanta	81	62	83	63	/	0	0	0	0
Blairsville	79	58	80	58	/	5	5	0	0
Cartersville	82	62	83	62	/	5	5	0	0
Columbus	83	62	84	63	/	0	0	0	0
Gainesville	80	62	82	62	/	5	5	0	0
Macon	83	59	85	61	/	0	0	0	0
Rome	83	63	85	62	/	5	5	0	0
Peachtree City	81	60	83	61	/	0	0	0	0
Vidalia	81	62	85	65	/	0	0	0	0

&&

.FFC WATCHES/WARNINGS/ADVISORIES...

NONE.

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13.0 Winds and Temperature Aloft Forecast

The NWS 0359 EDT Winds and Temperature Aloft forecast valid for the closest point to the accident site is included below:

```
FBUS31 KWNO 031959
FBUS31 KWNO 130759
FD1US1
DATA BASED ON 130600Z
VALID 131200Z   FOR USE 0800-1500Z. TEMPS NEG ABV 24000

FT  3000    6000    9000    12000    18000    24000    30000    34000    39000
TYS 2409 2812+12 3120+13 3020+06 2622-07 2634-19 283134 293844 294156
```

The closest forecast point to the accident site was Knoxville, Tennessee (TYS). The 0359 EDT TYS forecast for use between 0400 EDT and 1100 EDT indicated a wind at 3,000 ft from 240° at 9 knots and a wind at 6,000 ft from 280° at 12 knots with a temperature of 12°C.

14.0 Pilot Weather Briefing

The accident pilot did not request weather information¹⁸ from Leidos Flight Service.

A search of archived ForeFlight information indicated that the accident pilot requested and received weather information from ForeFlight at 0757 EDT with a planned departure of 0810 EDT. The weather information provided by ForeFlight contained all the standard weather forecast information, including the valid AIRMETs, PIREPs, GFA, and METARs. On the ForeFlight App, the accident pilot also checked weather imagery in the days prior to the accident flight and reviewed airport information from KDZJ at 0755 EDT the morning of the accident. For more information please see attachment 2.

15.0 Astronomical Data

The astronomical data obtained for the accident site on October 13, 2021, indicated the following:

SUN	
Begin civil twilight	0715 EDT
Sunrise	0740 EDT
Accident time	0816 EDT¹⁹
Sun transit	1322 EDT
Sunset	1904 EDT
End civil twilight	1929 EDT

At the time of the accident the Sun was located at an altitude of 6.44° and azimuth of 104.30°.

¹⁸ https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_91-92.pdf

¹⁹ Inserted accident time for reference and context.

E. LIST OF ATTACHMENTS

Attachment 1 – GFA valid for the accident site at accident time

Attachment 2 – ForeFlight correspondence

Submitted by:

Paul Suffern
Senior Meteorologist