

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ERA25FA201

METEOROLOGY

Specialist's Factual Report

July 28, 2025

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A. ACCIDENT

Location: Yulee, Florida
Date: May 10, 2025
Time: 0935 eastern daylight time (EDT)
1335 coordinated universal time (UTC)
Airplane: Piper PA-32R-300; Registration: N30689

B. METEOROLOGY SPECIALIST

Paul Suffern
Senior Meteorologist
National Transportation Safety Board
Washington, DC

C. DETAILS OF THE INVESTIGATION

The NTSB's Senior Meteorologist did not travel for this investigation but gathered all data remotely. Data for this investigation were collected 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 Specialist's Factual Report contains the meteorological factors pertinent to the weather surrounding the accident time. All times are 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 in feet (ft) 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 approximate latitude 30.625424° N, longitude 81.52865° W, at an elevation of 15 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 WPC, 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 Federal Aviation Administration (FAA) "Aviation Weather Handbook", FAA-H-8083-28.¹

1.1 Surface Analysis Chart

The NWS Surface Analysis Chart centered over the northcentral United States for 1100 EDT is provided as figure 1 with the location of the accident site within the black circle. The chart depicted a low-pressure system at 1008-hectopascals (hPa) located over the western panhandle of Florida. A warm front stretched west to east from the western Panhandle of Florida, across the accident site and into the Atlantic Ocean. Fronts can act as lifting mechanisms to help produce clouds and precipitation if sufficient moisture is present.

The station model closest to the accident site depicted an air temperature of 68°F, dew point temperature 66°F, partly cloudy sky cover, and an east wind at 10 knots.

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

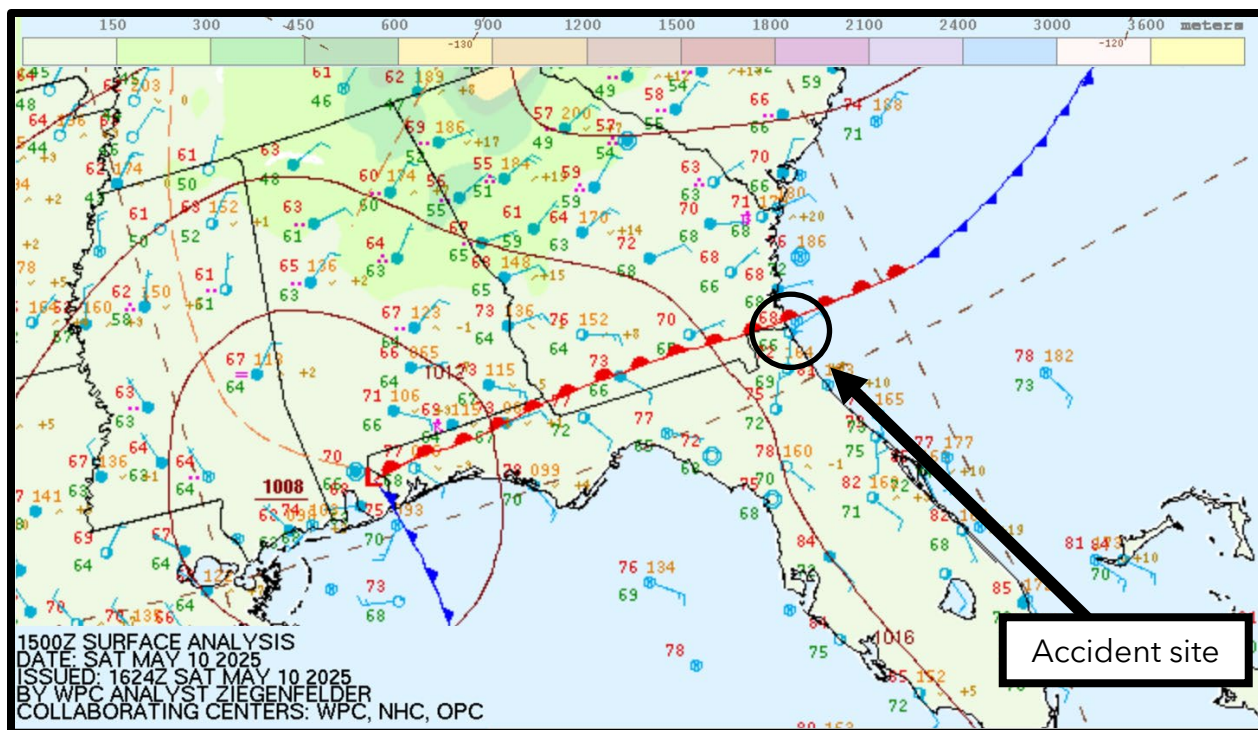


Figure 1. NWS Surface Analysis Chart for 1100 EDT.

1.2 Upper Air Charts

The NWS Storm Prediction Center (SPC) issued Constant Pressure Charts for 0800 EDT at 925-, 850-, and 700-hPa, which are presented in figures 2 through 4. The charts indicated a low- and mid-level trough² at 925- through 700-hPa north and southwest of the accident site. A vertically stacked low-pressure system³ was located between New Orleans, Louisiana, and the panhandle of Florida. The 925-hPa constant pressure chart depicted a southeast wind around 20 knots (figure 2) becoming a south wind at 25 knots by 700-hPa (figure 4).

² Trough - An elongated area of relatively low atmospheric pressure or heights.

³ Vertically stacked system - A low-pressure system, usually a closed low or cutoff low, which is not tilted with height, i.e., located similarly at all levels of the atmosphere.

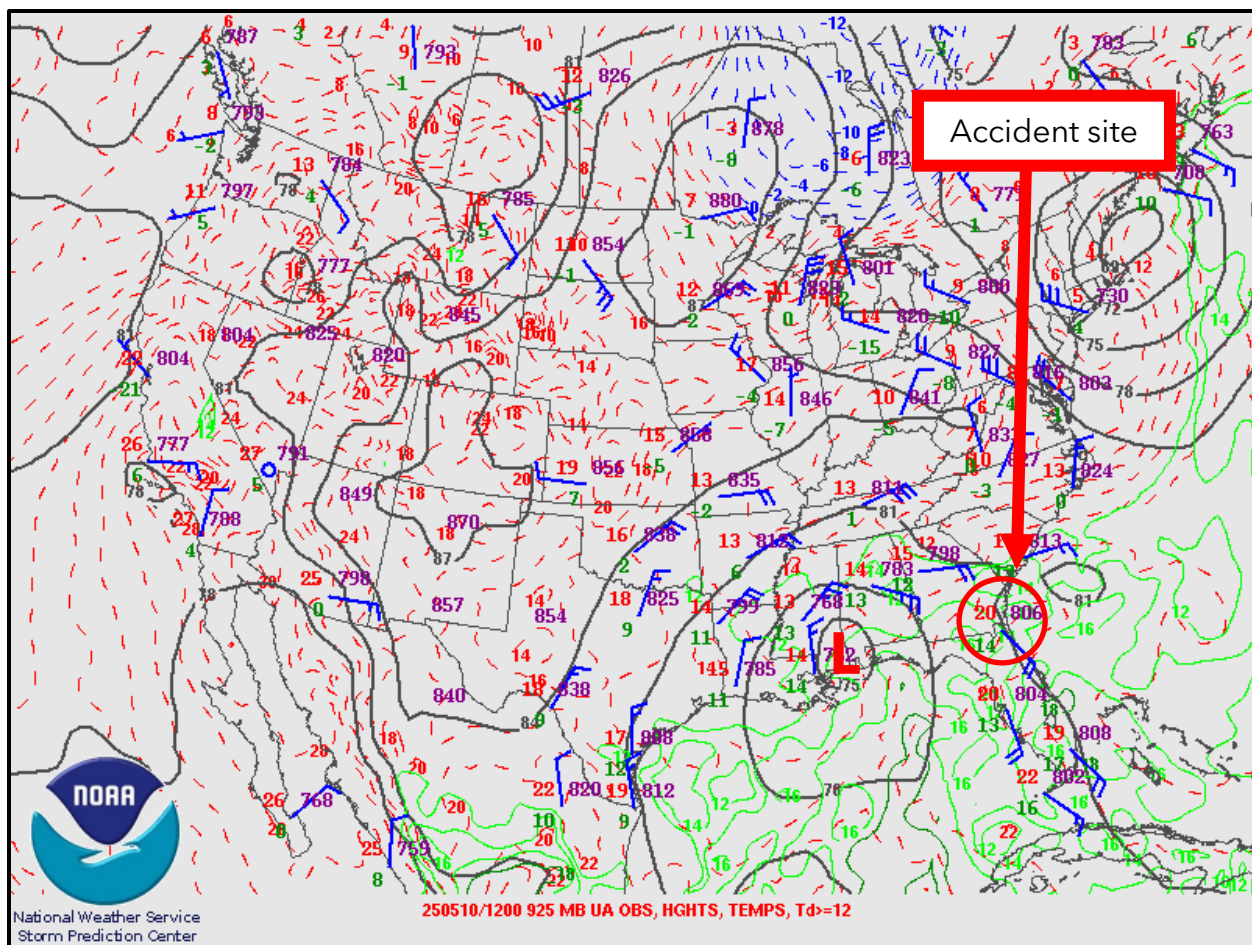


Figure 2. 925-hPa Constant Pressure Chart for 0800 EDT.

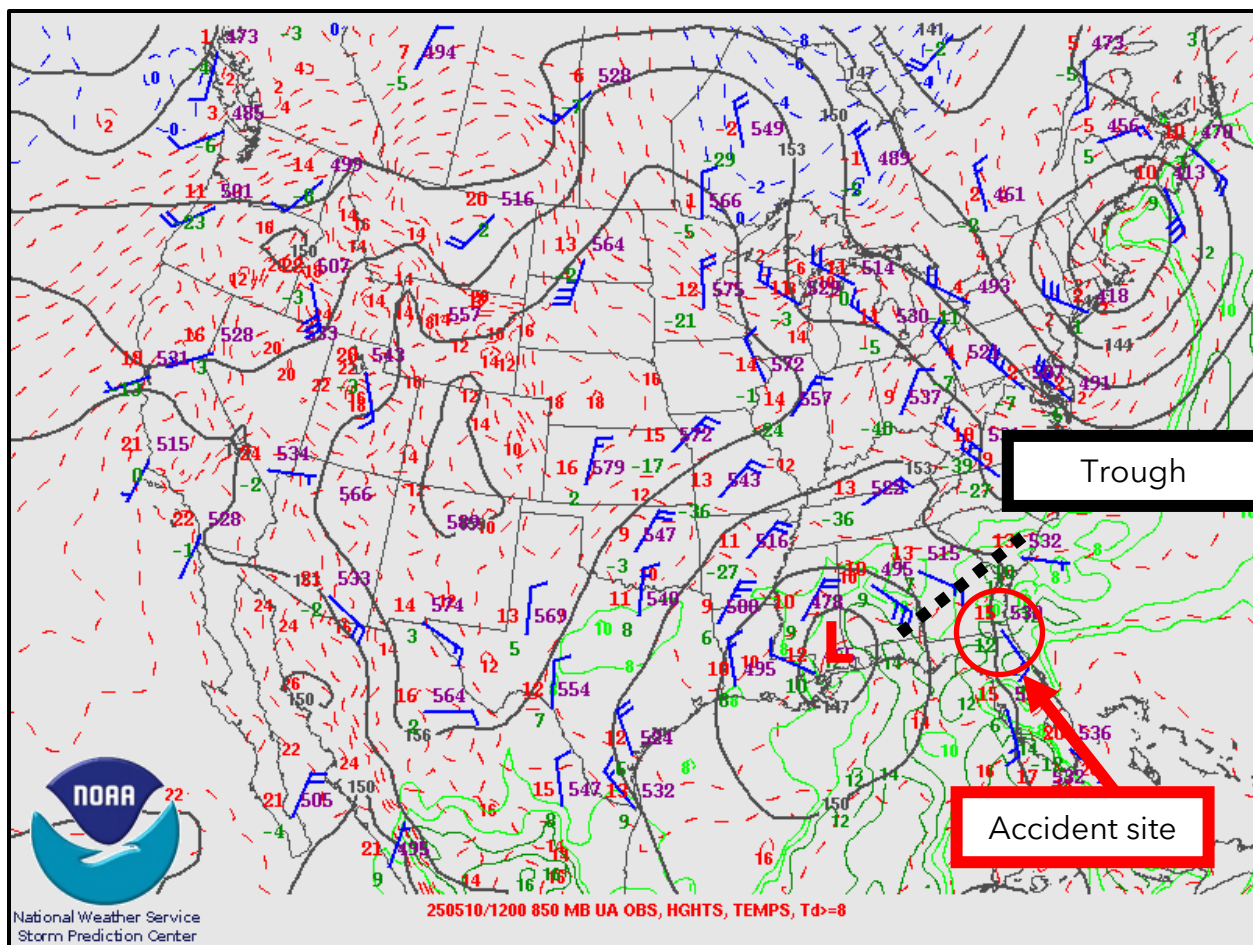


Figure 3. 850-hPa Constant Pressure Chart for 0800 EDT.

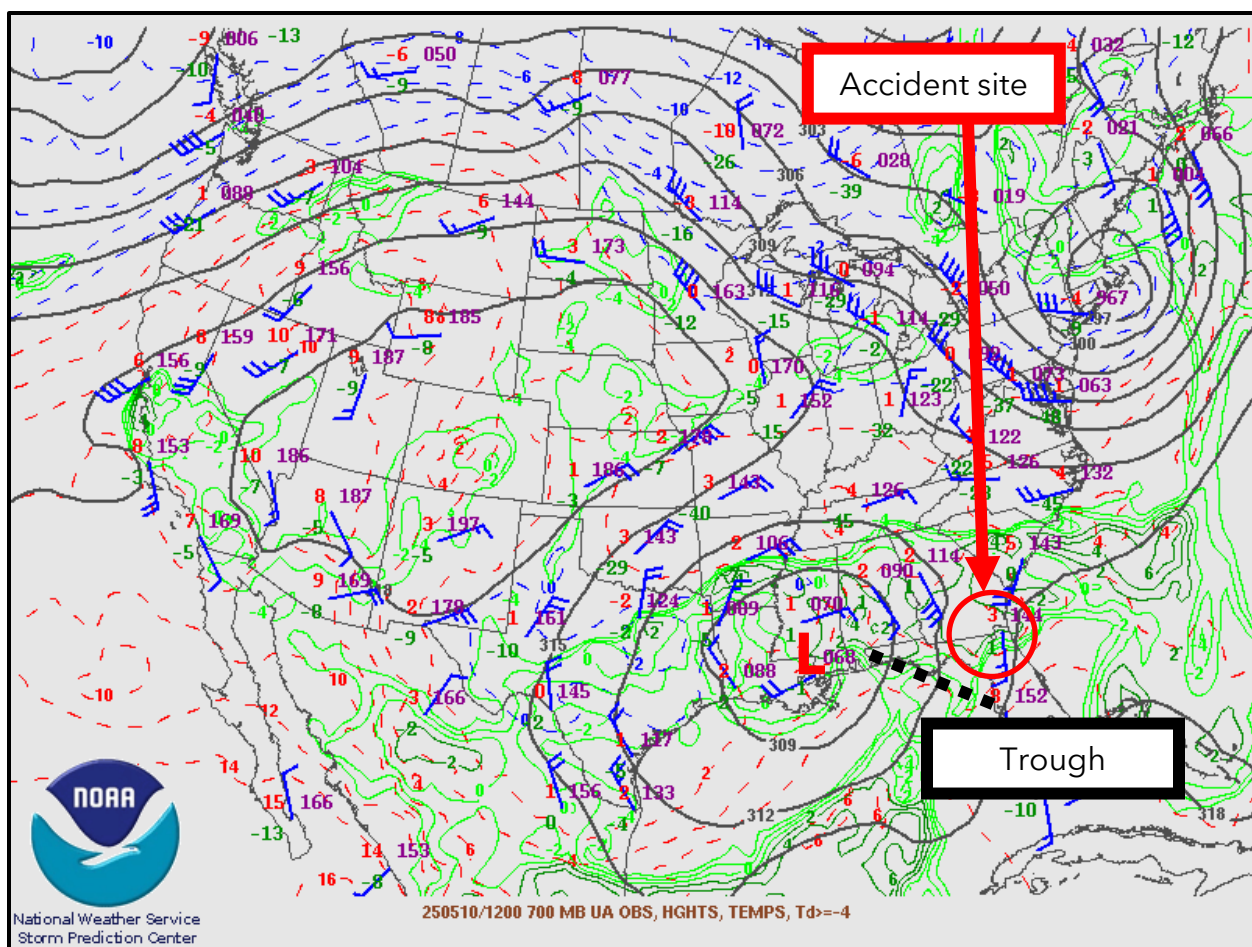


Figure 4. 700-hPa Constant Pressure Chart for 0800 EDT.

2.0 Storm Prediction Center Convective Outlook

SPC issued a Day 1 Convective Outlook at 0857 EDT (figure 5) with the accident site located in an area where a “marginal” risk (or a level 1 out of 5 risk) for severe thunderstorms was expected. In addition, the accident location was located within areas categorized by a 5% probability of damaging thunderstorms winds or wind gusts of 50 knots or higher within 25 miles of a point, a 5% probability of one inch diameter hail or larger within 25 miles of a point (figures 6 and 7), and a 2% probability of a tornado within 25 miles of a point (figure 8). The text of the SPC Day 1 Convective Outlook follows figure 8.

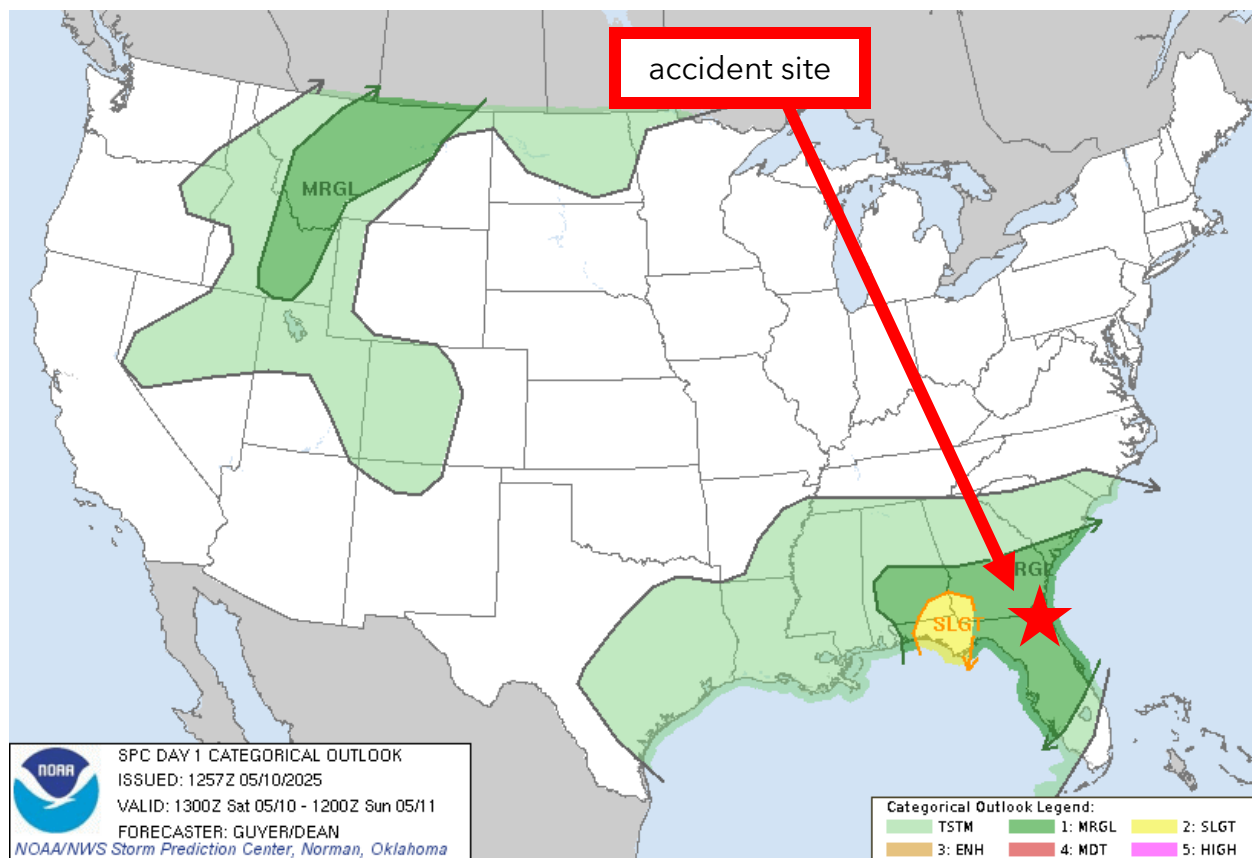


Figure 5. SPC day 1 Convective Outlook valid at the time of the accident.

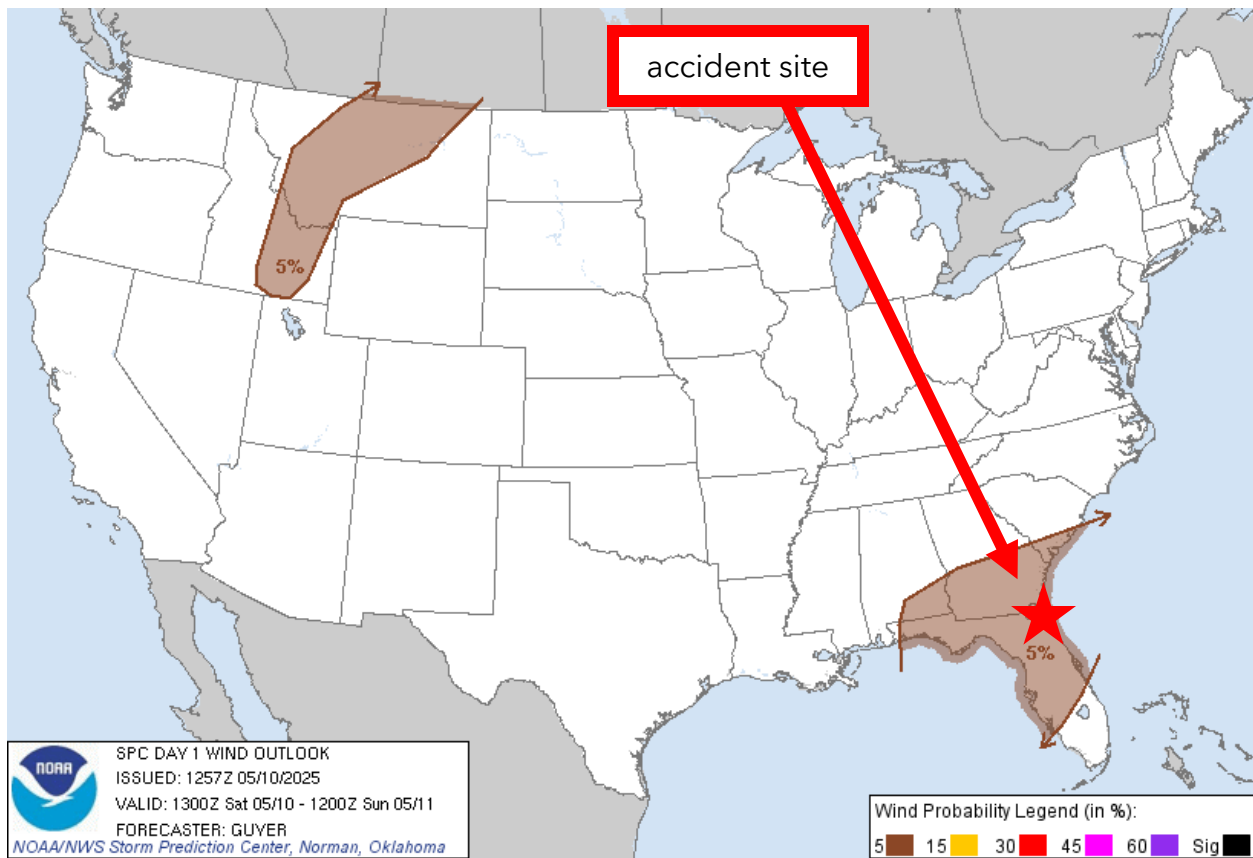


Figure 6. SPC day 1 Wind Outlook valid at the time of the accident.

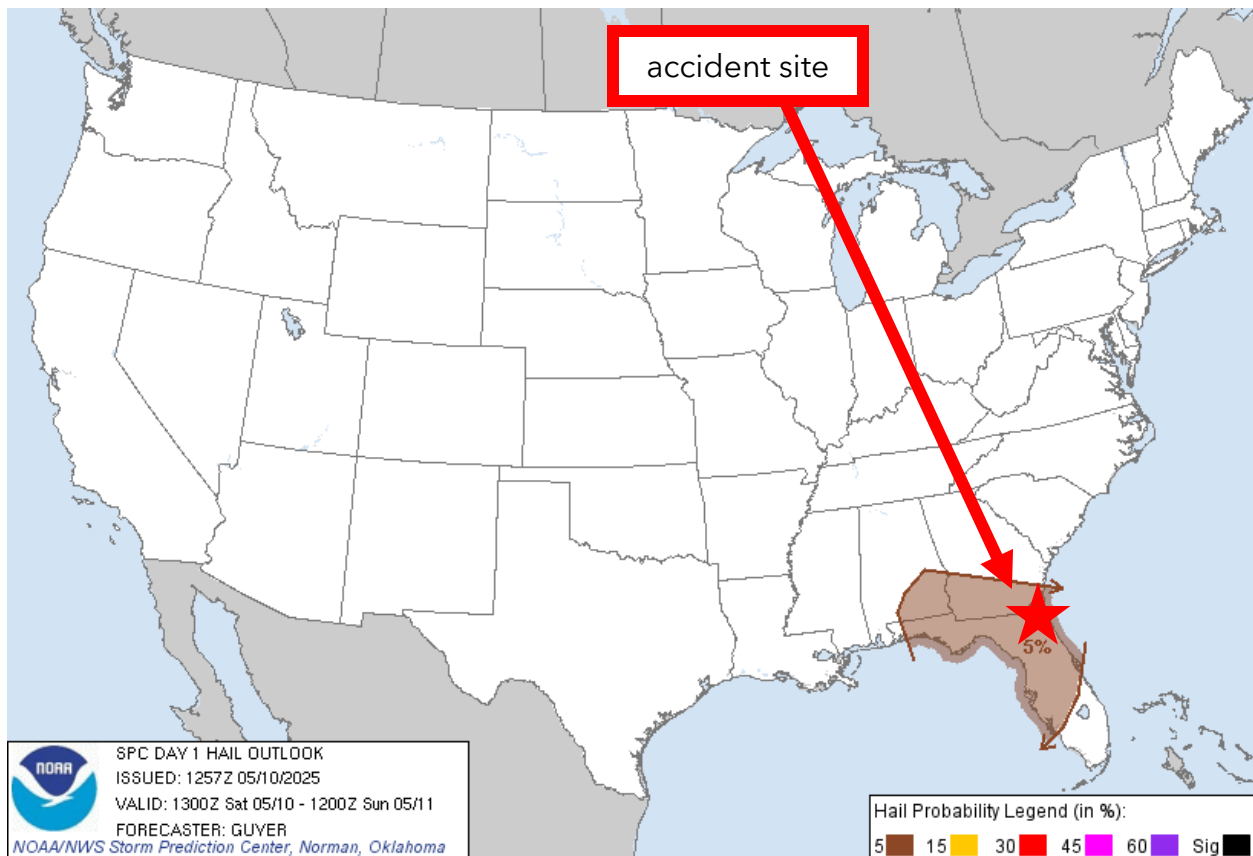


Figure 7. SPC day 1 Hail Outlook valid at the time of the accident.

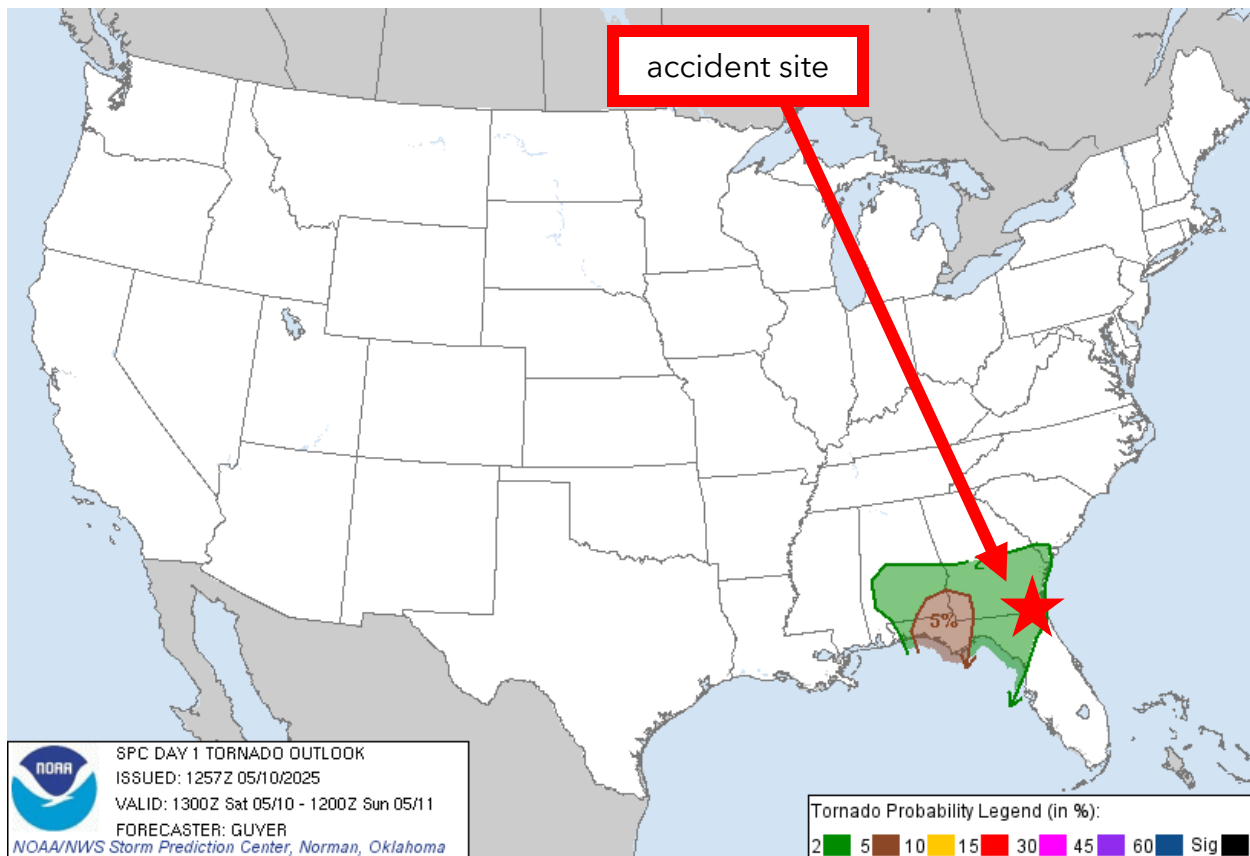


Figure 8. SPC day 1 Tornado Outlook valid at the time of the accident.

SPC AC 101257

Day 1 Convective Outlook
 NWS Storm Prediction Center Norman OK
 0757 AM CDT Sat May 10 2025

Valid 101300Z - 111200Z

...THERE IS A SLIGHT RISK OF SEVERE THUNDERSTORMS ACROSS THE FLORIDA
 PANHANDLE...SOUTHEAST ALABAMA...AND SOUTHWEST GEORGIA...

...SUMMARY...

Severe thunderstorms including a damaging wind and tornado risk may occur across parts of the Southeast, including northern Florida, southern Alabama and southern Georgia. Other thunderstorms with strong winds will be possible across the northern Rockies this afternoon and evening.

...Southeast including FL and far southeast AL/southern GA...

Multiple areas of strong storms are ongoing early this morning over the northeast Gulf of America, originating within a moist/unstable warm sector that continues to nudge closer to the coastal Florida Panhandle and Big Bend. As a moist low-level level influx continues, a severe threat will exist today particularly for coastal areas, with the northern extent of the severe risk not entirely clear.

However, some severe risk should exist as far north as the weak surface low and warm front effectively makes a northward progression. Where sufficient destabilization does occur, moderately strong/veering wind profiles will support storms capable of damaging winds and some tornado potential. This appears to mainly be across the Florida Panhandle, southeast Alabama, and southwest Georgia. Non-supercell processes might even be a factor for funnel/brief tornado potential farther west-northwest across Alabama toward the frontal wave/surface triple point, in closer proximity to the upper low. Otherwise, more of a damaging wind/some hail risk will exist southward across parts of the Florida Peninsula. For short-term info for northeast Florida/southeast Georgia, see Mesoscale Discussion 757.

...Montana/Idaho...

Strong heating and orographic lift over western Montana will favor widely scattered thunderstorms developing by mid-late afternoon. Very steep low-level lapse rates and a relatively dry sub-cloud layers will promote efficient evaporative cooling with the stronger cores as storms mature as they move northeast. A couple of clusters are possible with severe outflow. This activity will likely spread into northern/northeast Montana during the evening.

..Guyer/Dean.. 05/10/2025

CLICK TO GET WUUS01 PTSDY1 PRODUCT

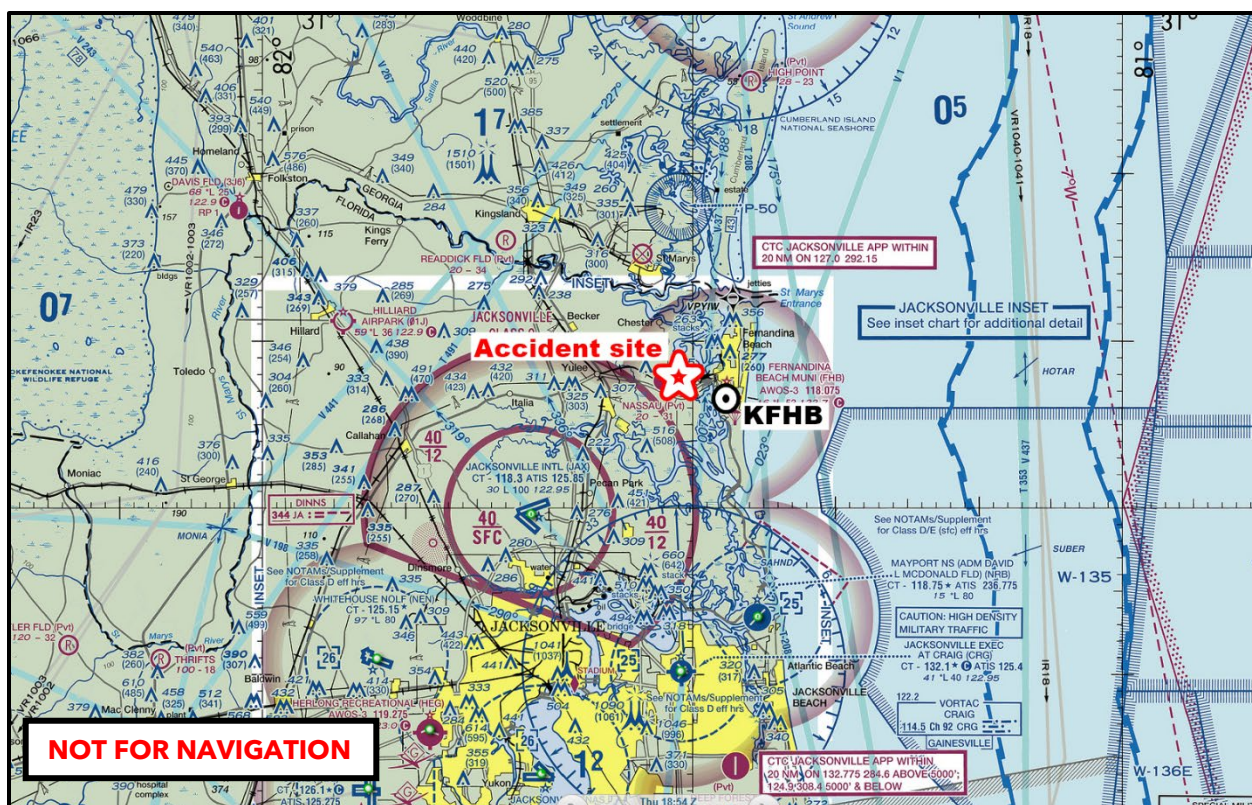
NOTE: THE NEXT DAY 1 OUTLOOK IS SCHEDULED BY 1630Z

3.0 Surface Observations

The area surrounding the accident site was documented using official Aviation Routine Weather Reports (METARs) and Aviation Selected Special Reports (SPECIs)⁴. The following observations were taken from standard code and are provided in plain language. A magnetic variation⁵ of 7° west was indicated over the area (figure 9).

⁴ Latest criteria for SPECIs can be found in the Federal Meteorological Handbook: [Federal Meteorological Handbook Number 1, Surface Weather Observations and Reports \(icams-portal.gov\)](https://icams-portal.gov/fmh1/)

⁵ Magnetic variation - The angle (at a particular location) between magnetic north and true north. Latest measurement taken from <https://skyvector.com/>



Fernandina Beach Municipal Airport (KFHB) was the destination airport and was equipped with an Automated Weather Observing System (AWOS⁶) and its longline⁷ reports were not augmented. The KFHB AWOS was located 4 miles east-southeast of the accident site (figure 9), at an elevation of 16 ft, and issued the following observations surrounding the accident time:⁸

[0835 EDT] METAR KFHB 101235Z AUTO 10009KT 10SM BKN060
BKN080 BKN120 24/21 A2999 RMK AO2 LTG DSNT SW AND W

⁶ AWOS – Automated Weather Observing System is equipped with meteorological instruments to typically 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. Certain AWOS may have different reporting or observational equipment.

⁷ "Longline" refers to the dissemination of weather observations with the intent that they are available in near-real time to national databases 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 weather observations are distributed.

⁸ The bold sections of products in this report are intended to highlight the text that directly reference the weather conditions that affected the accident region around the accident time. The local times in this section next to the METARs are provided for quick reference.

[0855 EDT] METAR KFHB 101255Z AUTO 10008KT 10SM SCT060
SCT085 SCT120 24/21 A2999 RMK AO2 LTG DSNT SW AND W

[0915 EDT] METAR KFHB 101315Z AUTO 12008KT 10SM VCTS SCT070
BKN085 25/21 A3001 RMK AO2 LTG DSNT SW THRU NW

**[0935 EDT] METAR KFHB 101335Z AUTO 18005KT 10SM VCTS
SCT023 BKN075 OVC085 25/20 A3004 RMK AO2 LTG DSNT SW
THRU N**

ACCIDENT TIME 0935 EDT

**[0955 EDT] METAR KFHB 101355Z AUTO 32013G20KT 2SM +TSRA
BR SCT006 SCT013 OVC021 22/20 A3007 RMK AO2 LTG DSNT
ALQDS P0020**

[1015 EDT] METAR KFHB 101415Z AUTO 33006KT 2SM +TSRA BR
SCT004 BKN015 OVC029 20/19 A3008 RMK AO2 LTG DSNT ALQDS
P0048

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

KFHB weather at 0935 EDT, automated, wind from 180° at 5 knots, visibility 10 miles or greater, vicinity⁹ thunderstorms, scattered clouds 2,300 ft above ground level (agl), broken ceiling at 7,500 ft agl, overcast skies at 8,500 ft agl, temperature of 25°C, dew point temperature of 20°C, and an altimeter setting of 30.04 inches of mercury (inHg). Remarks, station with a precipitation discriminator, lightning distant¹⁰ southwest through north.

KFHB weather at 0955 EDT, automated, wind from 320° at 13 knots with gusts to 20 knots, visibility 2 miles, heavy rain and thunderstorms, mist, scattered clouds 600 ft agl, scattered clouds at 1,300 ft agl, overcast ceiling at 2,100 ft agl, temperature of 22°C, dew point temperature of 20°C, and an altimeter setting of 30.07 inHg. Remarks, station with a precipitation discriminator, lightning distant all quadrants, 0.20 inches of precipitation since 0855 EDT.

Observations from the KFHB AWOS after the accident time identified IFR¹¹ conditions due to reduced visibilities in heavy rain and thunderstorms.

⁹ Vicinity is defined as the area between 5 to 10 SM from the center of the runway complex of an airport.

¹⁰ Distant is defined as the phenomena beyond 10 NM.

¹¹ 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

4.0 Upper Air Sounding

A High-Resolution Rapid Refresh (HRRR)¹² model sounding was created¹³ for the approximate accident site coordinates for 1000 EDT. The HRRR sounding was plotted on a standard Skew-T Log P diagram¹⁴ from the surface to 700-hPa (or approximately 10,000 ft) using the RAOB¹⁵ software package and is included as figure 10. The sounding depicted an elevation of 20 ft over the grid point. The sounding depicted the lifted condensation level (LCL)¹⁶ at 1,994 ft, the level of free convection (LFC)¹⁷ at 2,041 ft, and the convective condensation level (CCL)¹⁸ at 2,667 ft. The freezing level was located at 12,358 ft. The precipitable water value was 1.76 inches.

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.

¹² 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.

¹³ HRRR sounding was created using NOAA Air Resource Laboratory: [READY Archived Meteorology \(noaa.gov\)](https://ready.noaa.gov/).

¹⁴ 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.

¹⁵ RAOB - (The complete Rawinsonde Observation program) is an interactive sounding analysis program developed by Esonde Research Services, The Villages, Florida.

¹⁶ LCL - The height at which a parcel of moist air becomes saturated when it is lifted dry adiabatically.

¹⁷ LFC - The level at which a parcel of saturated air becomes warmer than the surrounding air and begins to rise freely. This occurs most readily in a conditionally unstable atmosphere.

¹⁸ 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.



²⁰ MVV is not usually considered a realistic estimate for maximum vertical velocity in a storm. Anecdotes suggest considering a value of MVV/2, however it is not well understood when or where such a half-value should be applied.

The 1000 EDT HRRR sounding wind profile indicated a near-surface wind from 140° at 10 knots with the wind veering²¹ to the southwest above 9,000 ft. The wind speed increased to 25 knots by 3,000 ft. RAOB indicated light low-level wind shear (LLWS) below 300 ft agl and light clear air turbulence in several layers between the surface and 10,000 ft.

5.0 Satellite Data

Geostationary Operational Environmental Satellite number 19 (GOES-19) imagery 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-19 bands 2 and 13, respectively) at wavelengths of 0.64 microns (μm) and 10.3 μm , respectively, were retrieved for the period from 0900 EDT through 1500 EDT and reviewed, and the closest images to the time of the accident were documented.

Figure 11 presents the GOES-19 visible image at 0936 EDT at 2X magnification with the accident site highlighted with a red square. Cumuliform cloud cover was indicated above the accident site with the cloud cover moving from southwest to northeast (attachment 1). Figure 12 presents the GOES-19 infrared image at 0936 EDT at 7X magnification with the accident site highlighted with a red square. Cloud cover was indicated above the accident site with lower brightness temperatures (green and blue colors; higher cloud tops) located above and surrounding the accident site. The brightness temperature of 216 Kelvin²² would have been near 39,000 ft based on the vertical temperature profile provided by the 1000 EDT HRRR sounding (not shown). It should be noted these figures have not been corrected for any parallax error.

²¹ Veered - Wind turning clockwise with height.

²² around -57°C

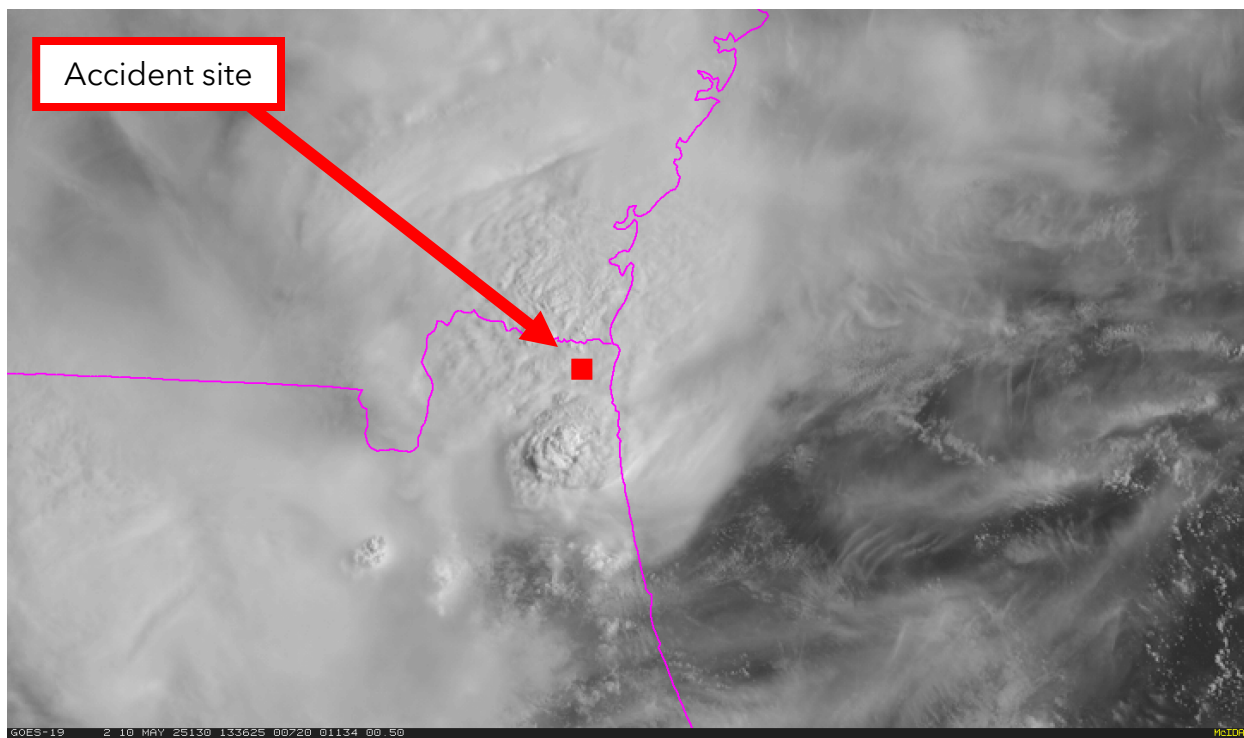


Figure 11. GOES-19 visible image at 0936 EDT.

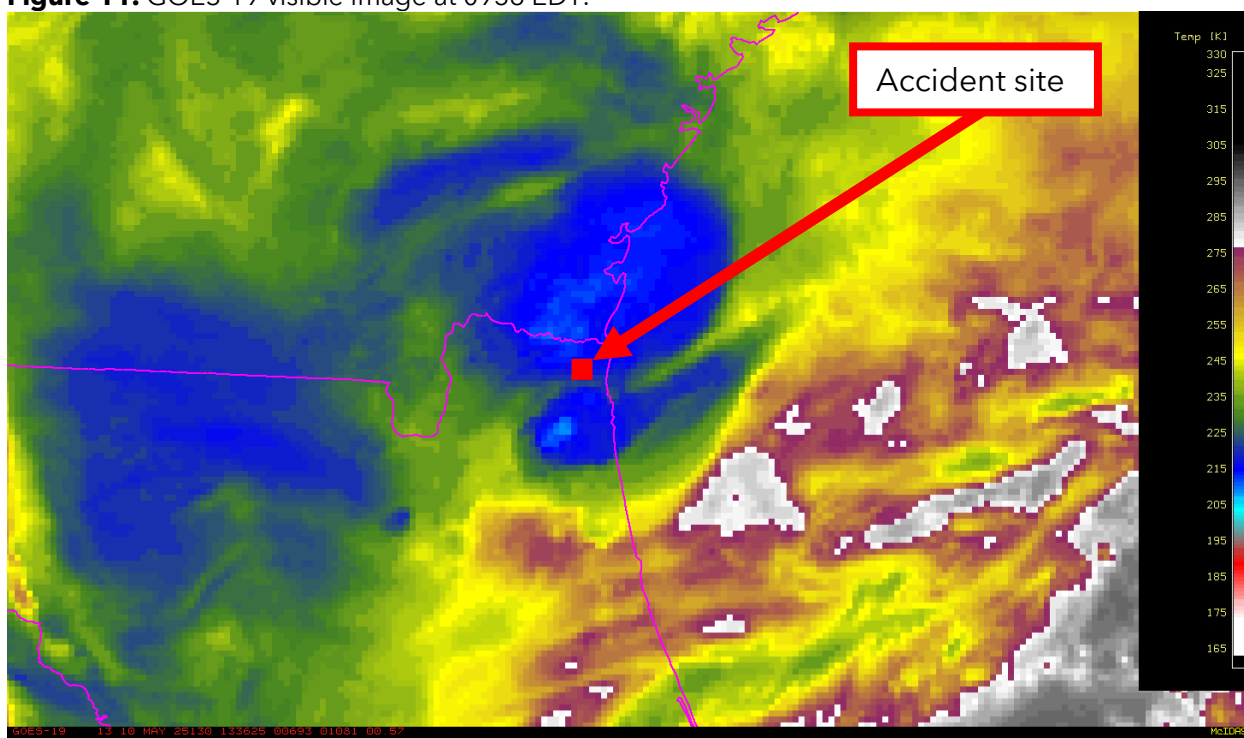


Figure 12. GOES-19 infrared image at 0936 EDT.

6.0 National Radar Imagery

A regional view of the NWS National Reflectivity Mosaic is included as figure 13 for 0935 EDT with the approximate location of the accident site marked by a red circle. The mosaic imagery depicted echoes of 25 to 55 dBZ²³ above the accident at the accident time.

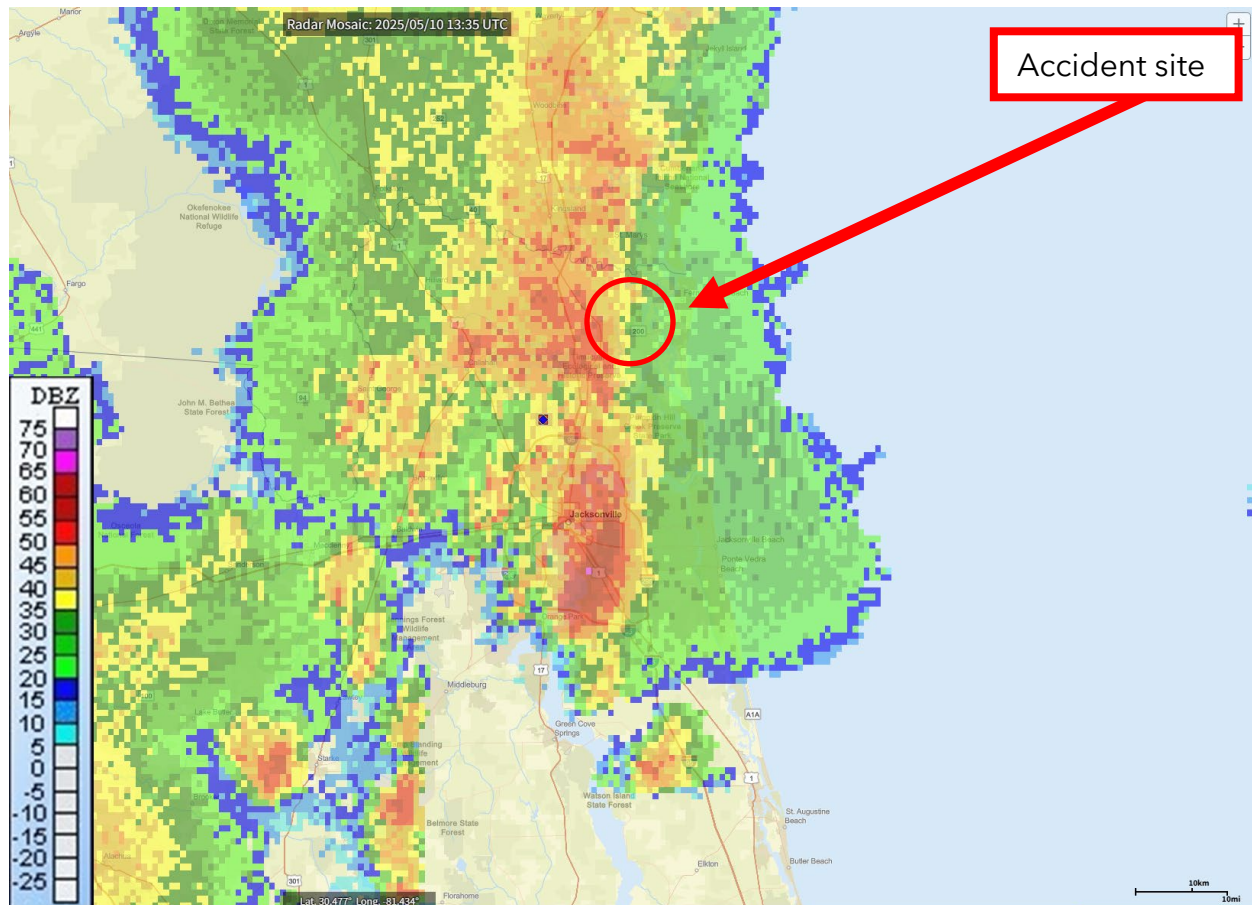


Figure 13. National Reflectivity Mosaic for 0935 EDT.

²³ dBZ - A non-dimensional "unit" of radar reflectivity which represents a logarithmic power ratio (in decibels or dB) with respect to radar reflectivity factor, Z.

7.0 Weather Surveillance Radar Imagery

The closest NWS Weather Surveillance Radar-1988 Doppler (WSR-88D)²⁴ to the accident site was from Jacksonville (KJAX), Florida, located 12 miles southwest of the accident site. The Level II archive radar data were obtained from the NCEI utilizing the NEXRAD Data Inventory Search and displayed using the NOAA's Weather and Climate Toolkit software.

7.1 Volume Scan Strategy

During the period surrounding the accident, the KJAX WSR-88D radar was operating in the precipitation mode VCP-212²⁵ (figure 14). The following figure provides an indication of the different elevation angles in this VCP, and the approximate height and width of the radar beam with distance from the radar site.

²⁴ The WSR-88D is an S-band 10-centimeter wavelength radar with a power output of 750,000 watts, and with a 28-foot parabolic antenna that concentrates the energy between a 0.87° and 0.96° beam width. The radar produces three basic types of products: base reflectivity, base radial velocity, and base spectral width.

²⁵ Contiguous Surveillance (CS)--The low Pulse Repetition Frequency (PRF) scan of the split cut. Gives a high $R_{\max}$ value to determine proper target location and intensity, but a low $V_{\max}$ value limits the velocities that can be measured.

Contiguous Doppler (CD)--The high PRF scan of the split cut. Gives a low $R_{\max}$ value causing more range folded (multiple trip) echoes, but a high $V_{\max}$ value to get higher, more accurate velocity values.

Batch Mode - Uses alternating low and high PRFs on each radial for one full rotation at each elevation angle. The two resulting data sets (low PRF and high PRF) are combined to resolve range ambiguity.

Used in the middle elevation angles.

W - With range unfolding (W)

WO - Without range unfolding (WO)

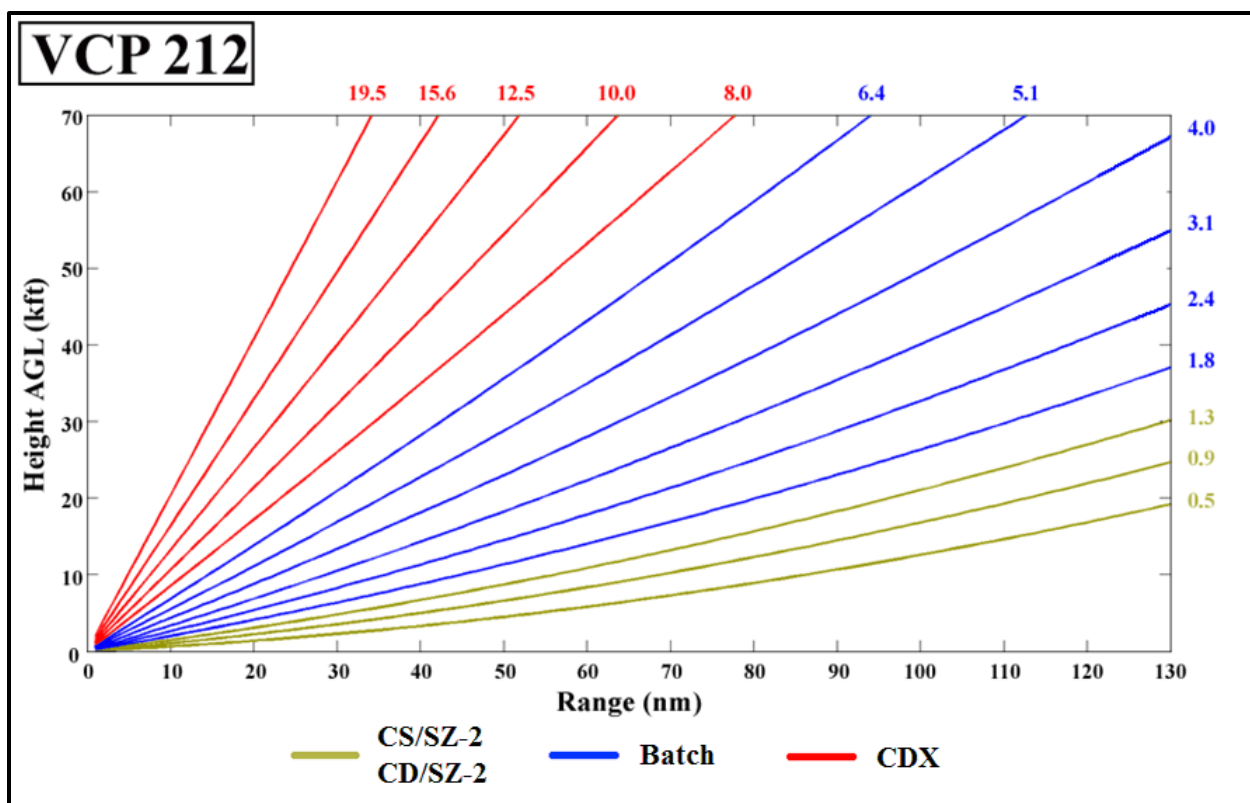


Figure 14. VCP-212 precipitation Mode Scan Strategy.

7.2 Beam Height Calculation

Assuming standard refraction²⁶ of the KJAX WSR-88D radar beam with the antenna elevation at 159 ft, and considering a beamwidth²⁷ of 0.95°, the following table shows the approximate heights for the 0.53° radar beam's center, top and base over the accident site. These heights have been rounded to the nearest 10 ft.

ANTENNA ELEVATION	BEAM CENTER	BEAM BASE	BEAM TOP
KJAX 0.53°	930 ft	320 ft	1,530 ft

Based on the radar height calculations, the elevation scans reviewed from KJAX listed in the above table combined to depict conditions between 320 ft and 1,530 ft over the accident site.

²⁶ Standard Refraction in the atmosphere is when the temperature and humidity distributions are approximately average, and values set at the standard atmosphere.

²⁷ Beamwidth - the angular separation between the half power points on the antenna radiation pattern, where the gain is one half the maximum value.

7.3 Reflectivity

Reflectivity is the measure of the efficiency of a target in intercepting and returning radio energy. With hydrometeors²⁸ 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 Handbook also defines the echo intensity levels and weather radar echo intensity terminology associated with those levels. For dBZ values less than 30 the weather radar echo intensity terminology should be "light." For dBZ values between 30 and 40, the terminology should be "moderate." "Heavy" terminology is used for dBZ values greater than 40 dBZ to 50 dBZ, inclusive. Finally, any dBZ values above 50 dBZ shall be described as "extreme."

7.4 Base Reflectivity Data

Figures 15 and 16 present the KJAX WSR-88D base reflectivity images for the 0.53° elevation scans initiated at times of 0933:06 and 0937:34 EDT with resolutions of 0.5° X 250 m. The reflectivity images depicted portions of reflectivity values between 30 and 45 dBZ (moderate to heavy intensity echoes) above the accident site at the accident time. The moderate to heavy intensity echoes were moving from west to east.

²⁸ Hydrometeors are any product of condensation or sublimation of atmospheric water vapor, whether formed in the free atmosphere or at the earth's surface; also, any water particles blown by the wind from 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. (e) Falling particles that evaporate before reaching the ground: virga. (f) Liquid or solid water particles lifted by the wind from the earth's surface: drifting snow, blowing snow, blowing spray. (g) Liquid or solid deposits on exposed objects: dew, frost, rime, and glazed ice.

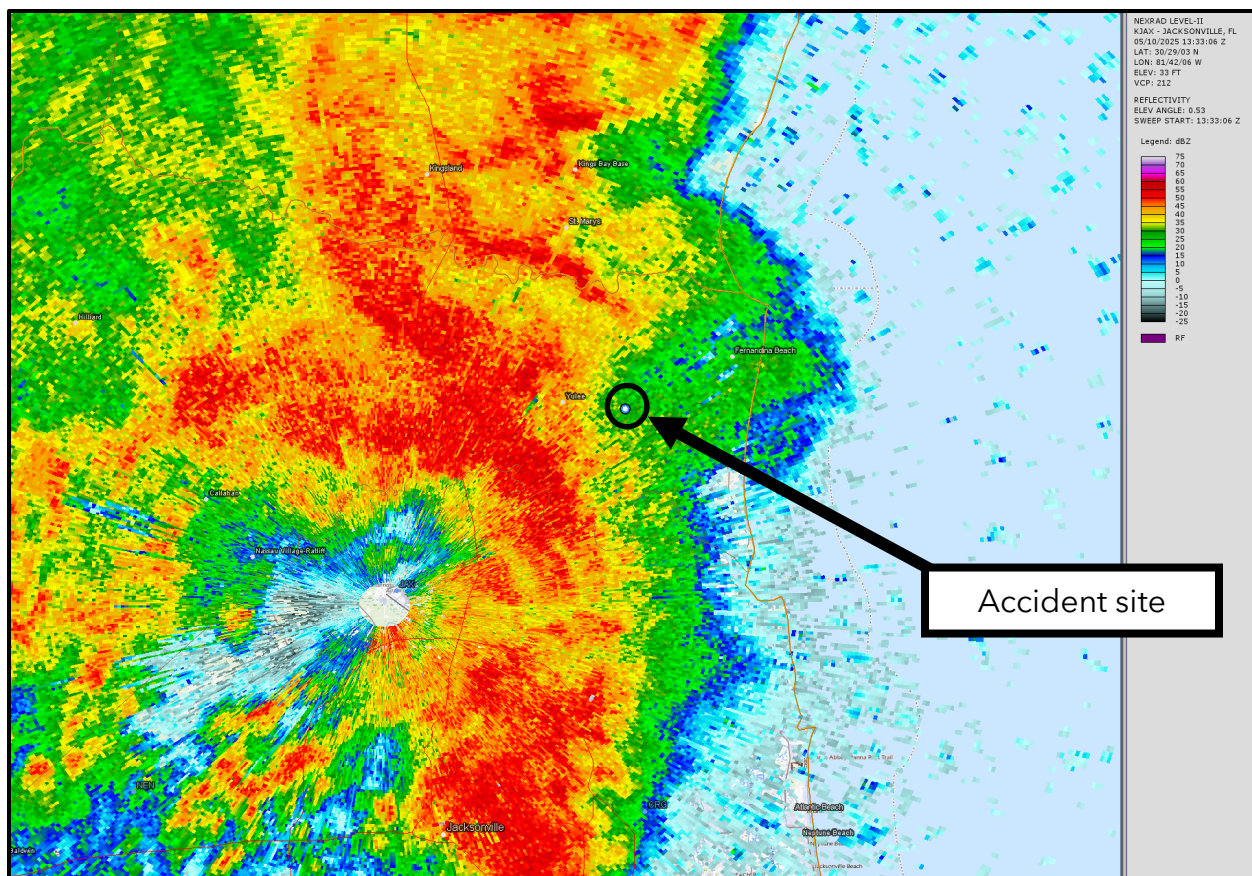


Figure 15. KJAX WSR-88D reflectivity for the 0.53° elevation scan initiated at 0933:06 EDT with the accident site marked with the black circle.

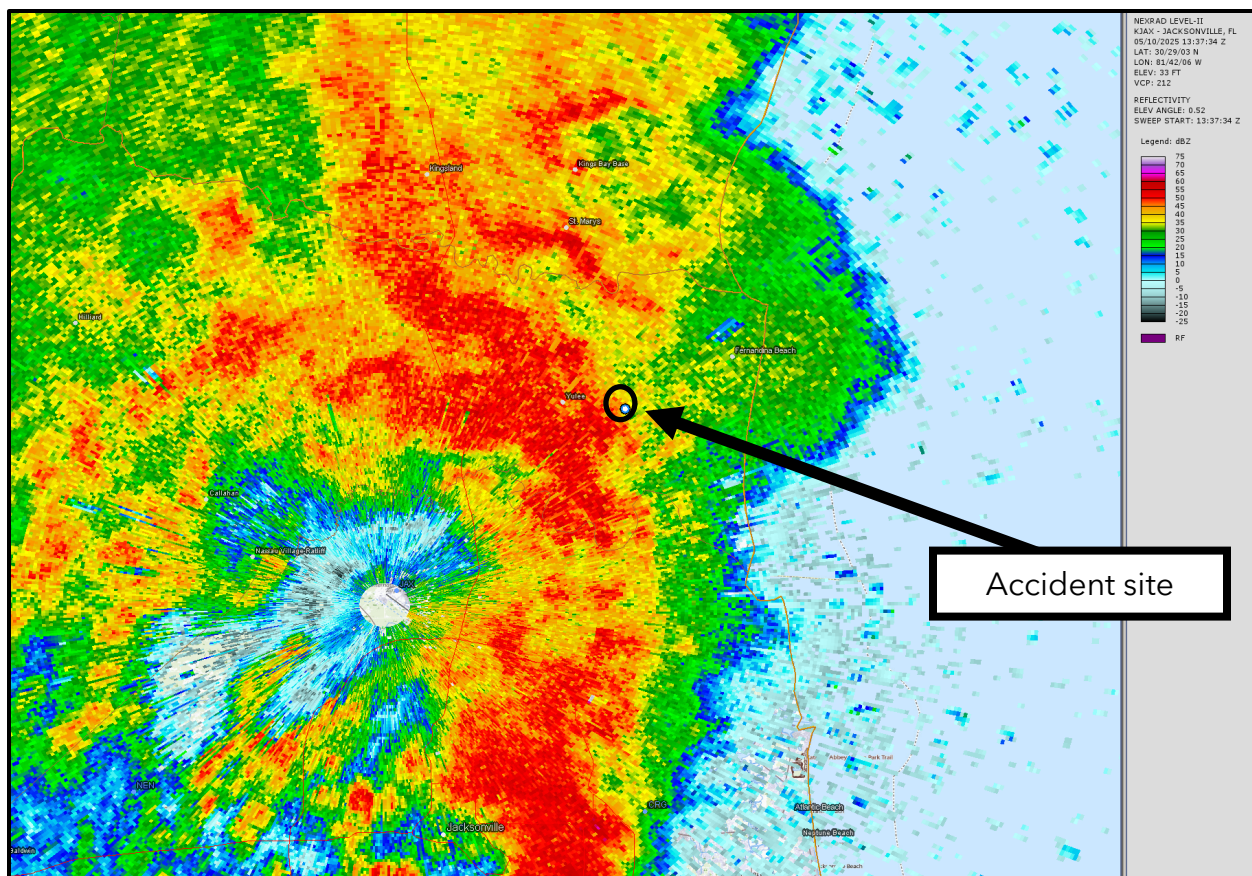


Figure 16. KJAX WSR-88D reflectivity for the 0.53° elevation scan initiated at 0937:34 EDT with the accident site marked with the black circle.

8.0 Pilot Reports

The longline-disseminated pilot reports²⁹ (PIREPs) distributed into the national airspace system (NAS) within 2 hours of the accident time and within 100 miles of the accident site below 18,000 ft are shown below:

SGJ UA /OV RWY 13 FINAL/TM 1515/FL010/TP E55P/SK SCT009/WX 5/TB MOD/RM
MOD RAIN ON FINAL

DAB UA /OV FIN/TM 1504/FL030/TP SR22/SK BKN020

JAX UA /OV OCF315020/TM 1447/FL080/TP CL35/SK VFR/TB LGT

SAV UA /OV 5 S BARWU/TM 1443/FL090/TP BE58/TB MOD CHOP

SSI UA /OV SSI020020/TM 1422/FL150/TP S22/TA M06/IC LGT RIME

JAX UA /OV SGJ/TM 1417/FLDURGD/TP P28A/SK BKN028

JAX UA /OV CRG320060/TM 1345/FL120/TP B752/SK SKC/WX BR/TB LGT

²⁹ Only PIREPs with the World Meteorological Organization headers UBFL**, UBGA**, and UBSC** were considered. These do not include pilot reports only broadcast via radio.

JAX UA /OV GNV/TM 1325/FLDURGD/TP B717/SK BKN040
DAB UA /OV EVB14008/TM 1302/FL030/TP C172/SK OVC030 TOPS
JAX UA /OV CRG340012/TM 1250/FL045/TP CRJ9/SK BASES065/TB SMOOTH
JAX UA /OV JAX/TM 1235/FLDURGD/TP A306/SK BASES 063
SAV UA /OV SAV190040/TM 1157/FL050/TP RV10/TB SMOOTH/RM SMOOTH BUT IN
THE SOUP
JAX UA /OV CRG215020/TM 1145/FL105/TP GLF4/SK TOP103/WX BR/TB LGT

9.0 Significant Meteorological Information

There were no non-convective Significant Meteorological Information (SIGMET) advisories valid for the accident site at the accident time. There was a Convective SIGMET³⁰ valid for the accident site at the accident time issued by the Aviation Weather Center (AWC). SIGMET 42E issued at 0855 EDT, valid through 1055 EDT, forecast an area of embedded thunderstorms with tops above FL450³¹ with the SIGMET box area moving from 260° at 25 knots (figure 17):

WSUS31 KPCI 101255
SIGE
MKCE WST 101255
CONVECTIVE SIGMET 42E
VALID UNTIL 1455Z
FL GA AND CSTL WTRS
FROM 20ENE AMG-70ENE CRG-150SW SRQ-210S CEW-20ENE AMG
AREA EMBD TS MOV FROM 26025KT. TOPS ABV FL450.
REF INTL SIGMET FOXTROT SERIES.

³⁰ US Convective SIGMETs - Convective SIGMETs are issued in the conterminous U.S. if these conditions are occurring or expected to occur:

- Line of thunderstorms at least 60 miles long with thunderstorms affecting 40% of its length
- Area of thunderstorms covering at least 40% of the area concerned and exhibiting a very strong radar reflectivity or a significant satellite or lightning signature
- Embedded or severe thunderstorms expected to occur for more than 30 minutes

Special issuance criteria occur with tornado, hail greater than 3/4 inch in diameter, and wind gusts greater than or equal to 50 knots. Any convective SIGMET implies severe or greater turbulence, severe icing, and low level wind shear. A convective SIGMET may be issued for any convective situation which the forecaster feels is hazardous to all categories of aircraft. Bulletins are issued hourly at Hour+55. The text of the bulletin consists of either an observation and a forecast or just a forecast. The forecast is valid for up to 2 hours or until superseded by the next hourly issuance.

³¹ Flight Level - A Flight Level (FL) is a standard nominal altitude of an aircraft, in hundreds of ft. This altitude is calculated from the International standard pressure datum of 1013.25 hPa (29.92 inHg), the standard sea-level pressure, and therefore is not necessarily the same as the aircraft's true altitude either above mean sea level or above ground level.

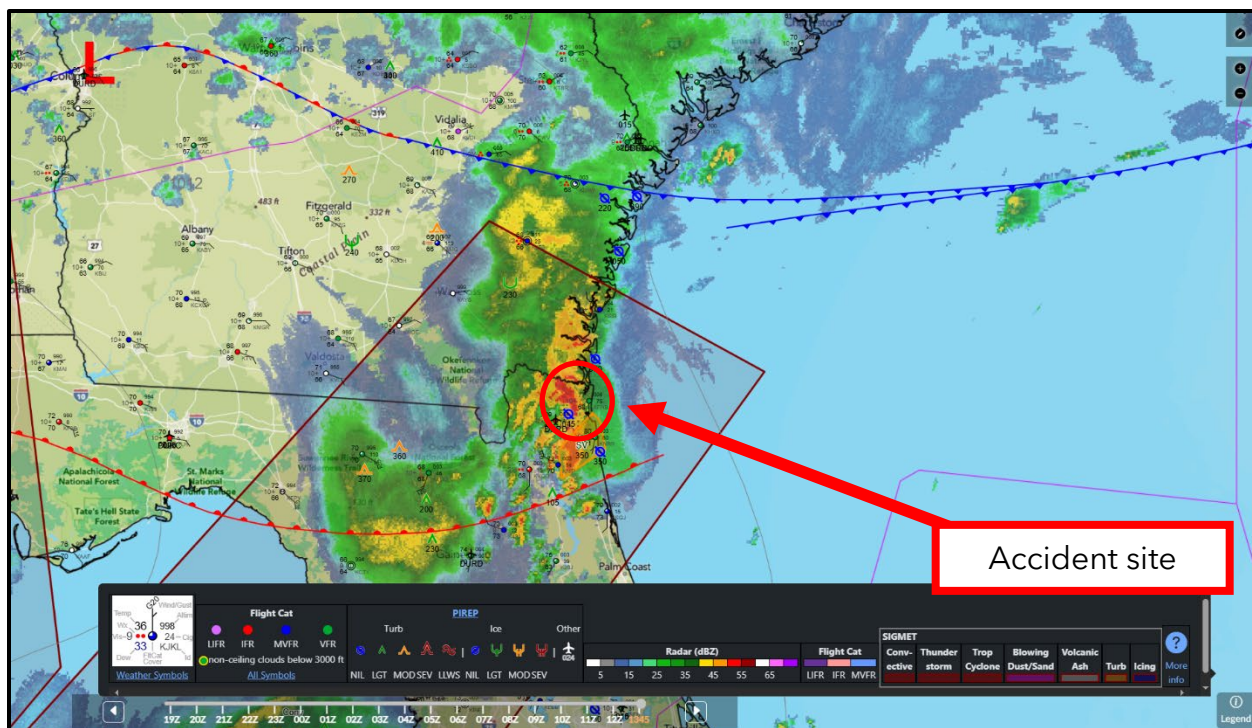


Figure 17. AWC graphic from 0945 EDT with Convective SIGMETs and PIREPs valid at 0945 EDT.

10.0 Center Weather Service Advisories and Information

The Jacksonville (ZJX) Air Route Traffic Control Center (ARTCC) Center Weather Service Unit (CWSU) was responsible for the accident region. There was no Center Weather Advisory (CWA) valid for the accident site at the accident time.

11.0 Graphical Forecasts for Aviation

The Graphical Forecasts for Aviation (GFA) products issued by the AWC before the accident flight and valid at 0800 and 1100 EDT and issued around 0600 EDT are shown in figures 18 through 21. The GFA surface forecast applicable at 0800 and 1100 EDT for the accident site indicated VFR visibilities with scattered (between 30 and 50 percent chance) thunderstorms with a southeast wind of 10 knots. The GFA cloud forecast applicable to the accident site for 0800 and 1100 EDT indicated overcast cloud cover at the accident site with clouds bases at 600 ft and cloud tops at FL340 to FL380³² and cirrus clouds above. The Graphical AIRMETs³³ (G-AIRMET) valid at 0800 and 1100 EDT are located on figures 18 through 21 advised of IFR conditions west of the accident site and moderate icing conditions above the freezing level³⁴ over the accident site. The only human-generated information reflected in the two GFA products were the G-AIRMETs.

³² Flight Level - A Flight Level (FL) is a standard nominal altitude of an aircraft, in hundreds of ft. This altitude is calculated from the International standard pressure datum of 1013.25 hPa (29.92 inHg), the standard sea-level pressure, and therefore is not necessarily the same as the aircraft's true altitude either above mean sea level or above ground level.

³³ Graphical AIRMETs found on the Aviation Weather Center webpage at <http://aviationweather.gov>, are graphical forecasts of en-route weather hazards valid at discrete times no more than 3 hours apart for a period of up to 12 hours into the future (for example, 00, 03, 06, 09, and 12 hours). G-AIRMETs are snap shots at discrete time intervals as defined above. The text AIRMET is the result of the production of the G-AIRMET but provided in a time smear for a 6hr valid period.

³⁴ Freezing level between 10,000 and 12,000 ft.

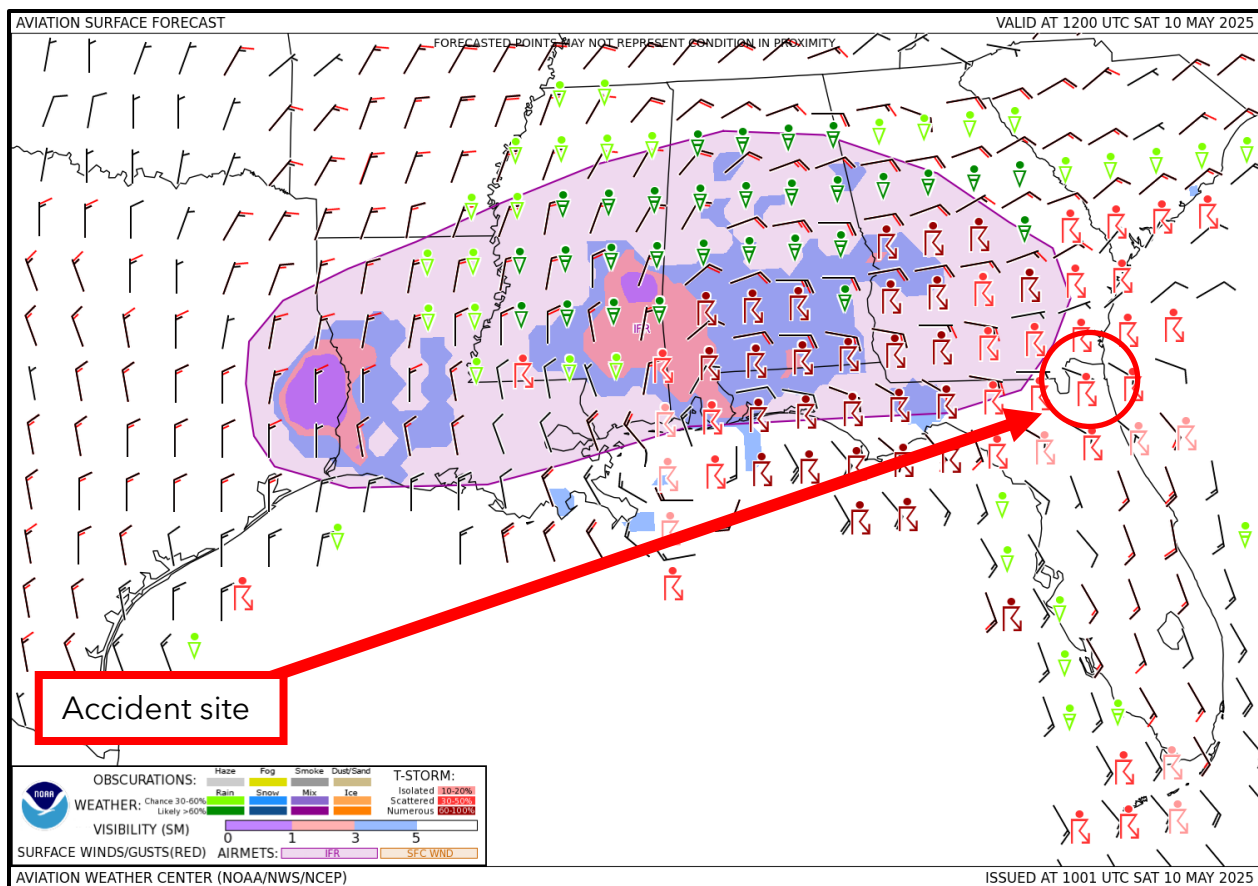


Figure 18. GFA Surface Forecast valid at 0800 EDT with forecast issued at 0601 EDT.

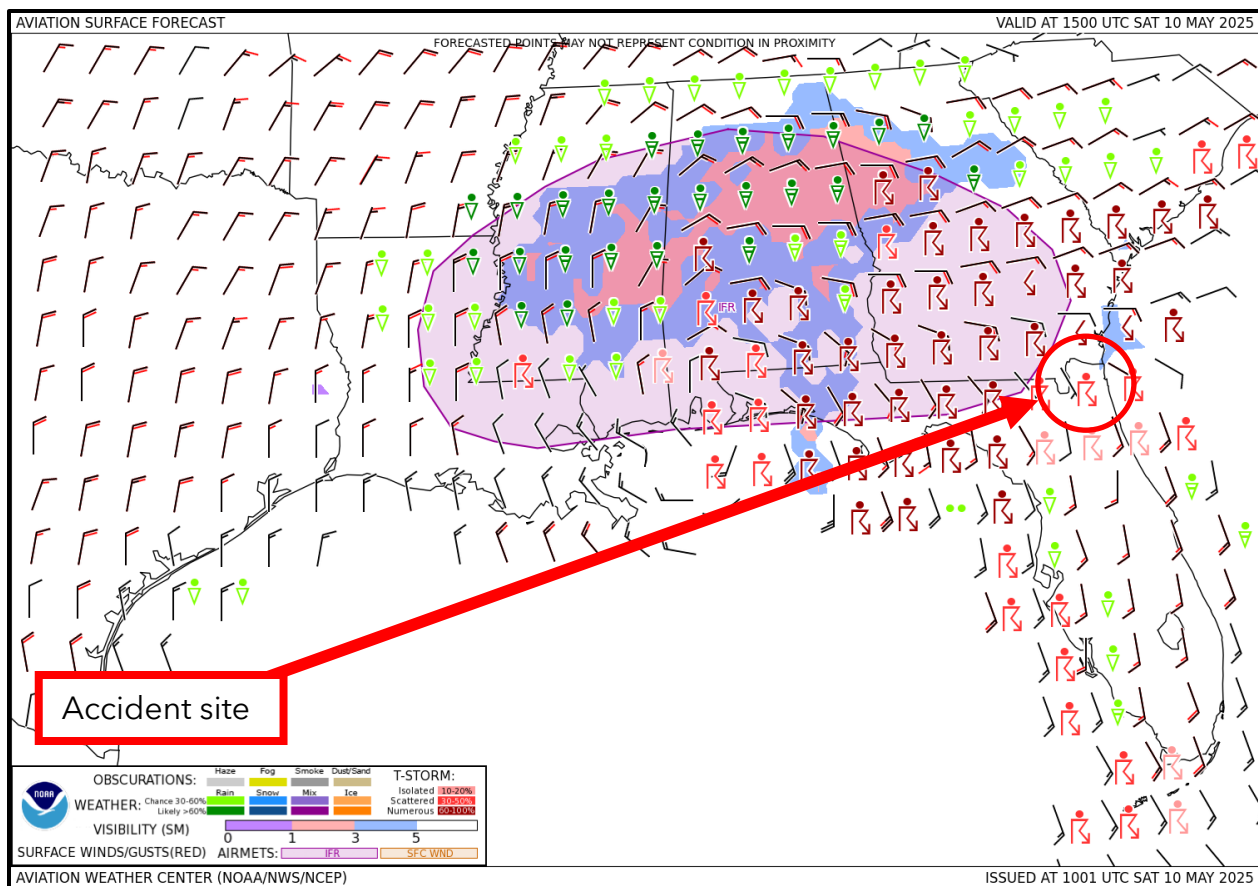


Figure 19. GFA Surface Forecast valid at 1100 EDT with forecast issued at 0601 EDT.

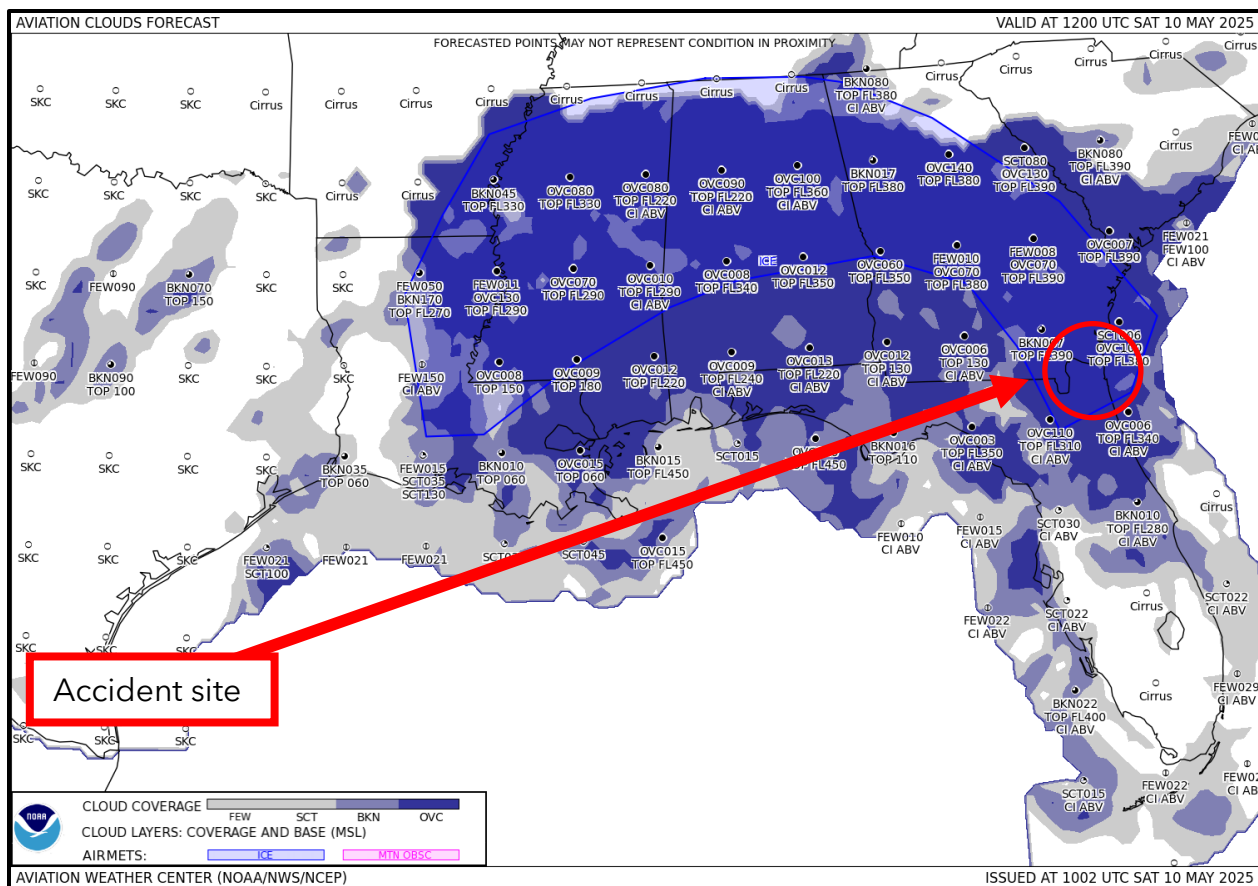


Figure 20. GFA Aviation Clouds Forecast valid at 0800 EDT with forecast issued at 0602 EDT.

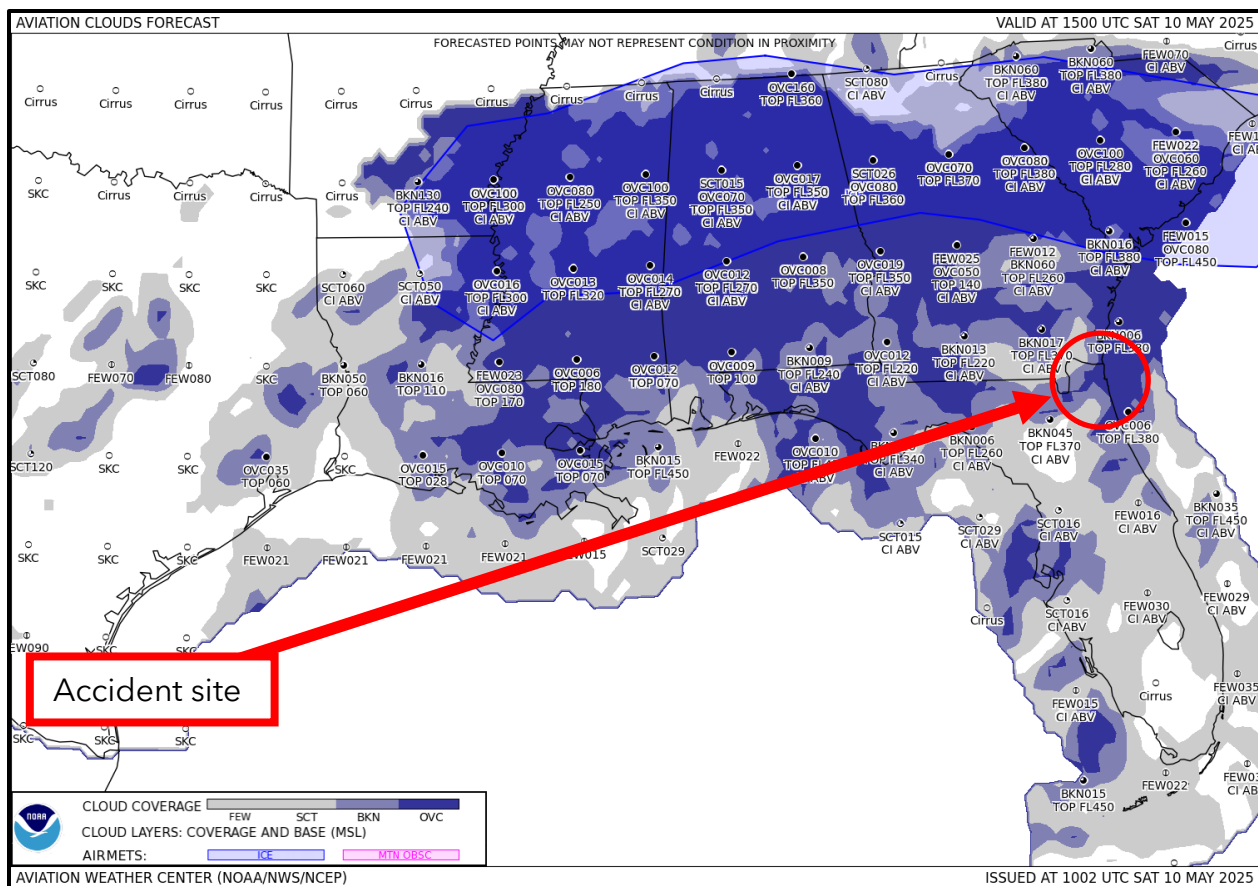


Figure 21. GFA Aviation Clouds Forecast valid at 1100 EDT with forecast issued at 0602 EDT.

12.0 Terminal Aerodrome Forecast

The closest location with an NWS Terminal Aerodrome Forecast³⁵ (TAF) was Jacksonville International Airport (KJAX) located 11 miles southwest of the accident site. The KJAX TAF current at the time of the accident is included below with the amended TAF issued at 0852 EDT and was valid for a 23-hour period beginning at 0900 EDT:

³⁵ 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

FTUS42 KJAX 101252 AAB

TAFJAX

TAF AMD

KJAX 101252Z 1013/1112 VRB20G30KT 1SM +SHRA VCTS SCT020 BKN030CB
OVC070

FM101330 12010KT P6SM -SHRA VCTS SCT020 BKN030CB OVC070

TEMPO 1014/1016 6SM -TSRA BR SCT015 BKN025CB OVC050

FM102000 09012G18KT P6SM VCTS SCT025 BKN035CB BKN120

TEMPO 1021/1101 VRB25G35KT 2SM +TSRA BR BKN015 OVC025CB

FM110100 12009KT P6SM -SHRA SCT025 BKN040 OVC070

FM110600 11006KT P6SM SCT040 BKN070 BKN120=

Between 0930 EDT and 1600 EDT, the KJAX forecast expected a wind from 120° at 10 knots, visibility greater than 6 miles, light rain showers, vicinity thunderstorms, scattered clouds at 2,000 ft agl, a broken ceiling of cumulonimbus clouds at 3,000 ft agl, and overcast skies at 7,000 ft agl.

13.0 National Weather Service Area Forecast Discussion

The NWS weather forecast office in Jacksonville, Florida, (WFO JAX) was responsible for the public surface forecast in the region of the accident site. WFO JAX issued the following Area Forecast Discussion (AFD) at 0818 EDT, which was the AFD issued closest to the accident time with an aviation section.

FXUS62 KJAX 101218

AFDJAX

Area Forecast Discussion

National Weather Service Jacksonville FL

818 AM EDT Sat May 10 2025

...New AVIATION...

For the latest NE FL and SE GA Daily Key Messages please visit:

<https://www.weather.gov/media/jax/briefings/nws-jax-briefing.pdf>

.AVIATION...

(12Z TAFS)

Issued at 818 AM EDT Sat May 10 2025

Showers and thunderstorms will impact most of the regional terminals this morning. TEMPO groups for MVFR to brief IFR conditions have been placed in the TAFS for GNV, SSI, and the Duval County terminals, with confidence too low to include SGJ for morning impacts at this time. Stronger convection is possible in the 13Z-14Z time frame at GNV, as a line of thunderstorms moves quickly northeastward. Please check for amendments this morning at GNV, as IFR conditions will be possible during heavier downpours, in addition to brief wind gusts in excess of 30 knots. Current

trends are for this convection to weaken as it pushes northeastward across the rest of the terminals, but brief IFR visibilities are possible towards 13Z at SSI. Ceilings should lift to VFR early this afternoon as the initial wave of convection exits, followed by thunderstorms redeveloping along the I-95 corridor towards 20Z. TEMPO and PROB30 groups have been placed the TAFS into the early evening hours, with higher confidence for IFR conditions and briefly gusty winds in excess of 30 knots at the Duval County terminals, SGJ, and SSI. Activity may linger through around 06Z at SGJ. Outside of convection, onshore surface winds will increase and will become gusty at the SSI and SGJ coastal terminals later this morning, with sustained speeds increasing to 15-20 knots by 16Z. Surface winds will shift to southerly at SGJ towards 18Z.

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.NEAR TERM...

(Today through Tonight)

Issued at 255 AM EDT Sat May 10 2025

Low pressure troughing is over parts of northeast FL at this time while west-east oriented the frontal boundary remains nearly stationary over southeast GA. Low pressure system over the north Gulf coast will be nearly stacked today from the sfc to 500 mb while mid/upper level impulses rotate around the mid level gyre over the eastern Gulf and the nrn FL peninsula today. With generally weak flow from the east-southeast up to about 10-15 mph today, the sea breezes and frontal boundary over southeast GA will serve as efficient mechanisms for showers and thunderstorms development as soon as the mid morning hours and throughout the afternoon. Best forcing will be over eastern zones where higher than average PWATs of about 1.7 inches and an unstable airmass will lead to numerous to widespread showers and storms. Soundings from the HRRR & RAP suggest a few storms may be strong/briefly severe with locally damaging wind gusts and small to large hail. Based SPC has highlighted much of the area in a marginal risk of severe storms. In addition, there is a marginal risk of excessive rainfall per WPC, and HREF shows potential for amounts of about 3-4 inches in some areas. Overall, we have likely to widespread rain chances today and these chances lead into the early evening hours. Highs today will be limited by clouds and convection with only upper 70s to lower 80s north zones to mid to upper 80s south zones.

Tonight, convective activity will transition to the marine waters in the evening and push to the east-northeast. Overnight, with the juicy airmass in place and another impulse shifting northeast across the area, a re-development of isolated to scattered convection looks probable but probably not too intense given more a more stable airmass overnight. Lows expected in the 65-70 deg range in most areas.

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.SHORT TERM...

(Sunday through Monday night)

Issued at 255 AM EDT Sat May 10 2025

An upper level low will remain nearly stationary over Louisiana, sending rounds of shortwaves over the area for the next couple of days. These shortwaves, coupled with surface fronts positioned to the north of the Florida/ Georgia line and off the Gulf coast, along with ample moisture, will aid in continuing rain and thunderstorms over the area Sunday and Monday. Expect heavy rain and isolated thunderstorms, especially along the front and where the afternoon sea-breezes converge. Temperatures aloft are cool enough to produce hail with some of the deeper/stronger storms along with damaging winds and locally heavy rainfall.

Daytime high temperatures will be in the upper 70s to low 80s over southeast Georgia and in the 80s over northeast Florida Sunday. Overnight, rain and storms continue with lows in the mid to upper 60s. Daytime temperatures cool slightly for Monday with highs in the upper 70s to low 80s. Rain chances will begin to decrease overnight Monday into Tuesday morning with overnight lows in the 60s

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.LONG TERM...

(Tuesday through Friday)

Issued at 255 AM EDT Sat May 10 2025

Tuesday, the surface fronts will finally begin to shift north and east, dropping chances for precipitation to 30-60%, and continue to trend downward to below 10% by Wednesday night. Drier high pressure will fill into the area, clearing out some of the cloud cover and allowing temperatures to start warming up. Daytime temperatures will slowly increase as the week progresses from normal seasonal average to above average by the end of the week.

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.MARINE...

Issued at 255 AM EDT Sat May 10 2025

South-southeast winds and seas have increased slightly compared to yesterday. We see this trend continuing into tonight and Sunday with a good chance of at least exercise caution headlines by tonight and on Sunday. Winds continue to be breezy from the south- southeast on Monday and Monday night ahead of a cold front so the exercise caution headline is likely to continue. Winds turn more south-southwest by Tuesday. The main concerns also are about the offshore-moving thunderstorms this afternoon and tonight, which will pose a risk of strong winds over 34 knots and hail of at least 3/4 inch.

Rip Currents: A bit more elevated surf than yesterday will keep a moderate risk of rip currents in place today. May need to monitor trends for a high risk for some beaches today if surf and winds gets higher than forecast. Wind and surf conditions only increase further by Sunday and Monday so a high risk looks probable.

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.HYDROLOGY...

Issued at 255 AM EDT Sat May 10 2025

Periods of heavy rainfall expected later today and into this evening as shown by latest CAM model guidance. Have included heavy rainfall wording in the forecast grids. On the whole, model guidance from the GFS, ECMWF, and NBM show total rainfall amounts through Tuesday, May 13th, of 3-5 inches with the 90th percentile (near worst case) of 6-8 inches in some locations. The Weather Prediction Center has marginal risk for today, and a "Slight" Risks (Level 2 out of 4) for Excessive Rainfall on Sunday and Monday for most portions of the area, highlighting this risk for localized flash flooding (around a 15 percent probability on Sunday and Monday).

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.PRELIMINARY POINT TEMPS/POPS...

AMG 77 65 79 67 / 90 70 100 90

SSI 79 71 80 70 / 80 70 90 80

JAX 84 68 84 68 / 80 60 80 80

SGJ 85 70 84 69 / 70 60 70 80

GNV 88 68 85 68 / 70 50 90 90

OCF 89 70 86 69 / 70 50 90 80

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.JAX WATCHES/WARNINGS/ADVISORIES...

FL...None.

GA...None.

AM...None.

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14.0 Astronomical Data

The astronomical data obtained for the accident site on May 10, 2025, indicated the following:

SUN

Begin civil twilight 0609 EDT

Sunrise 0634 EDT

Accident time 0935 EDT³⁶

Sun transit 1322 EDT

Sunset 2011 EDT

End civil twilight 2037 EDT

At the time of the accident the Sun was at an altitude of 37.13° above the horizon at an azimuth of 90.16°.

15.0 Pilot Weather Information

Title 14 CFR 91.103 states that “Each pilot in command shall, before beginning a flight, become familiar with all available information concerning that flight.” FAA AC 91-92 “Pilot’s Guide to a Preflight Planning” (dated March 15, 2021) provided pilot guidance on preflight self-briefings, including planning, weather interpretation, and risk identification/mitigation skills. The AC further stated in part:

Pilots adopting these guidelines will be better prepared to interpret and utilize real-time weather information before departure and en route, in the cockpit, via technology like Automatic Dependent Surveillance-Broadcast (ADS-B) and via third-party providers.³⁷

A search of archived information indicated that the accident pilot did not request weather information from Leidos Flight Service, nor did the accident pilot have an account with ForeFlight. It is unknown what, if any, weather information the accident pilot viewed prior to or during the accident flight.

³⁶ Inserted accident time for reference and context.

³⁷ https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_91-92.pdf. The AC also listed multiple online FAA resources for aviation flight planning services for adverse weather.

E. LIST OF ATTACHMENTS

Attachment 1 - GOES-19 visible satellite animation from 0826 to 1026 EDT
with lightning flash data overlaid

Submitted by:

Paul Suffern
Senior Meteorologist