



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

April 11, 2016

Group Chairman's Weather Study Report

METEOROLOGY

ERA16FA074

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A. ACCIDENT

Location: 8 miles south-southeast of Greenville, Florida

Date: December 17, 2015

Time: approximately 1943 eastern standard time (0043 UTC¹ on December 18, 2015)

Aircraft: Hinton RV-4, registration: N77BP

B. METEOROLOGY GROUP

Paul Suffern

Senior Meteorologist

National Transportation Safety Board

Operational Factors Division, AS-30

Washington, D.C. 20594-2000

C. SUMMARY

For a summary of the accident, refer to the *Accident Factual* report, which is available in the docket for this investigation.

D. 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 the NTSB's Washington D.C. office and from official National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) sources including the National Centers for Environmental Information (NCEI). All times are eastern standard time (EST) on December 17, 2015, and are based upon the 24-hour clock, where local time is -5 hours from UTC, and UTC=Z (unless otherwise noted). Directions are referenced to true north and distances in nautical miles. Heights are above mean sea level (msl) unless otherwise noted. Visibility is in statute miles and fractions of statute miles.

The accident location was located at latitude 30.35° N, longitude 83.61° W, approximate elevation 105 feet.

¹ UTC – is an abbreviation for Coordinated Universal Time.

E. 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 (NCEP) and the Weather Prediction Center (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 joint NWS and Federal Aviation Administration (FAA) Advisory Circular “Aviation Weather Services”, AC-0045G CHG 1.

1.1 Surface Analysis Chart

The NWS Surface Analysis Chart for 1900 EST is provided as figure 1, with the approximate location of the accident site marked. The chart depicted a cold front just west of the accident site stretched from south-southwest into the Gulf of Mexico to north-northeast through central Georgia and into western North Carolina. A low pressure center with a pressure of 1008-Hectopascals (hPa) was located in western North Carolina. The station models around the accident site depicted temperatures in the upper 60’s to mid 70’s Fahrenheit (F), with temperature-dew point spreads of 2° F or less, a south wind around 5 knots east of the cold front and a northwest wind under 10 knots west of the cold front. Mostly cloudy skies and light rain were located around the accident site at 1900 EST. With a light surface wind environment and small temperature-dew point spreads, it would be expected for any low clouds and mist to remain in place east of the cold front. A lifting mechanism such as a cold front would help to aid in the formation of more clouds and precipitation at and around the accident site at the accident time.

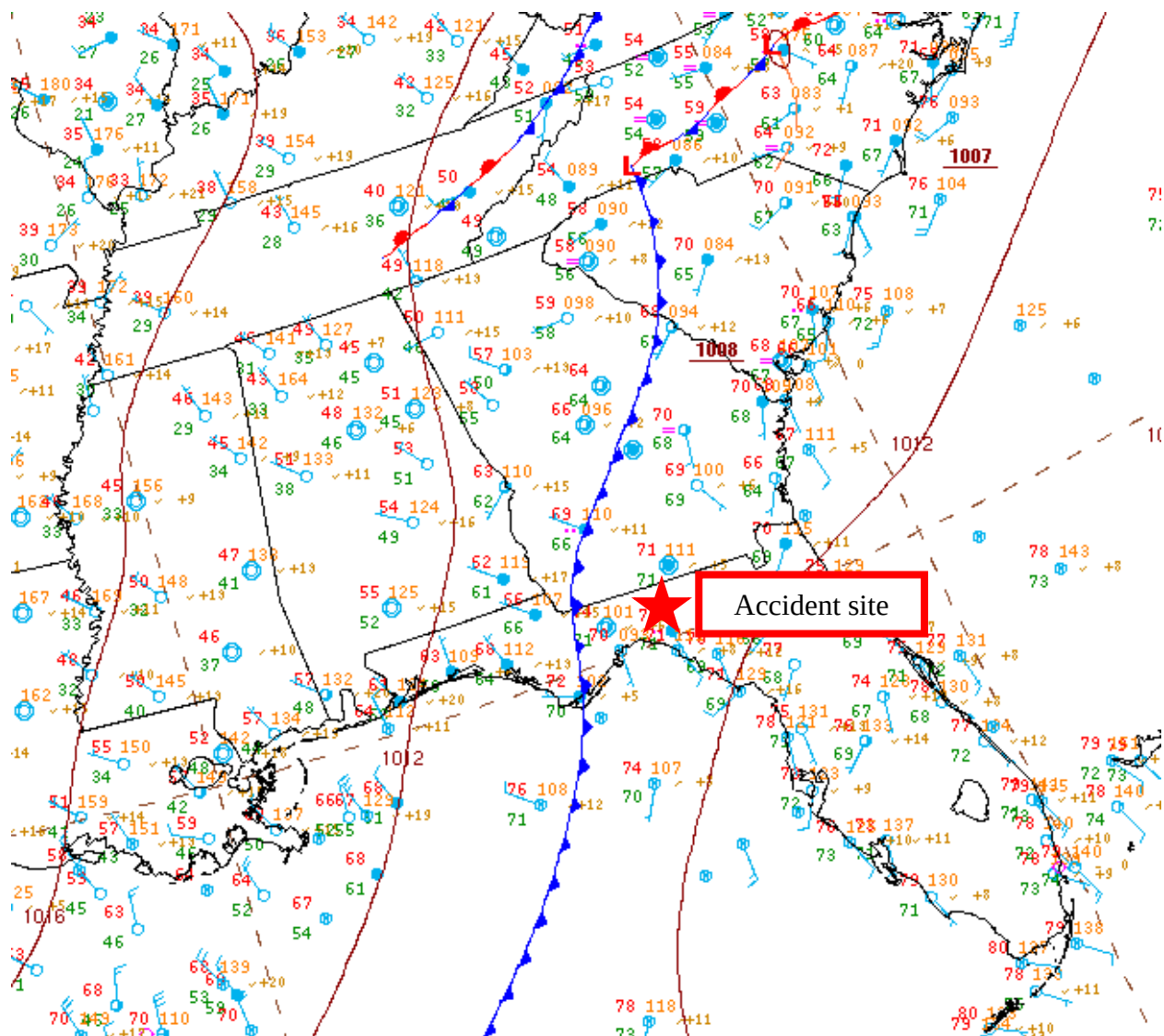


Figure 1 – NWS Surface Analysis Chart for 1900 EST

1.2 Upper Air Charts

The NWS Storm Prediction Center (SPC) Constant Pressure Charts for 1900 EST at 850-, 700-, 500-, and 300-hPa are presented in figures 2 through 5. The 850-hPa chart depicted a low-level trough² just to the west of the accident site at 1900 EST and areas near and ahead of troughs are typically areas where enhanced rising motion, clouds, or precipitation can occur. There was a southwest wind between 20 and 30 knots at 850-hPa (figure 2) with that wind increasing in magnitude to 85 to 90 knots by 300-hPa (figure 5) while remaining out of the southwest.

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

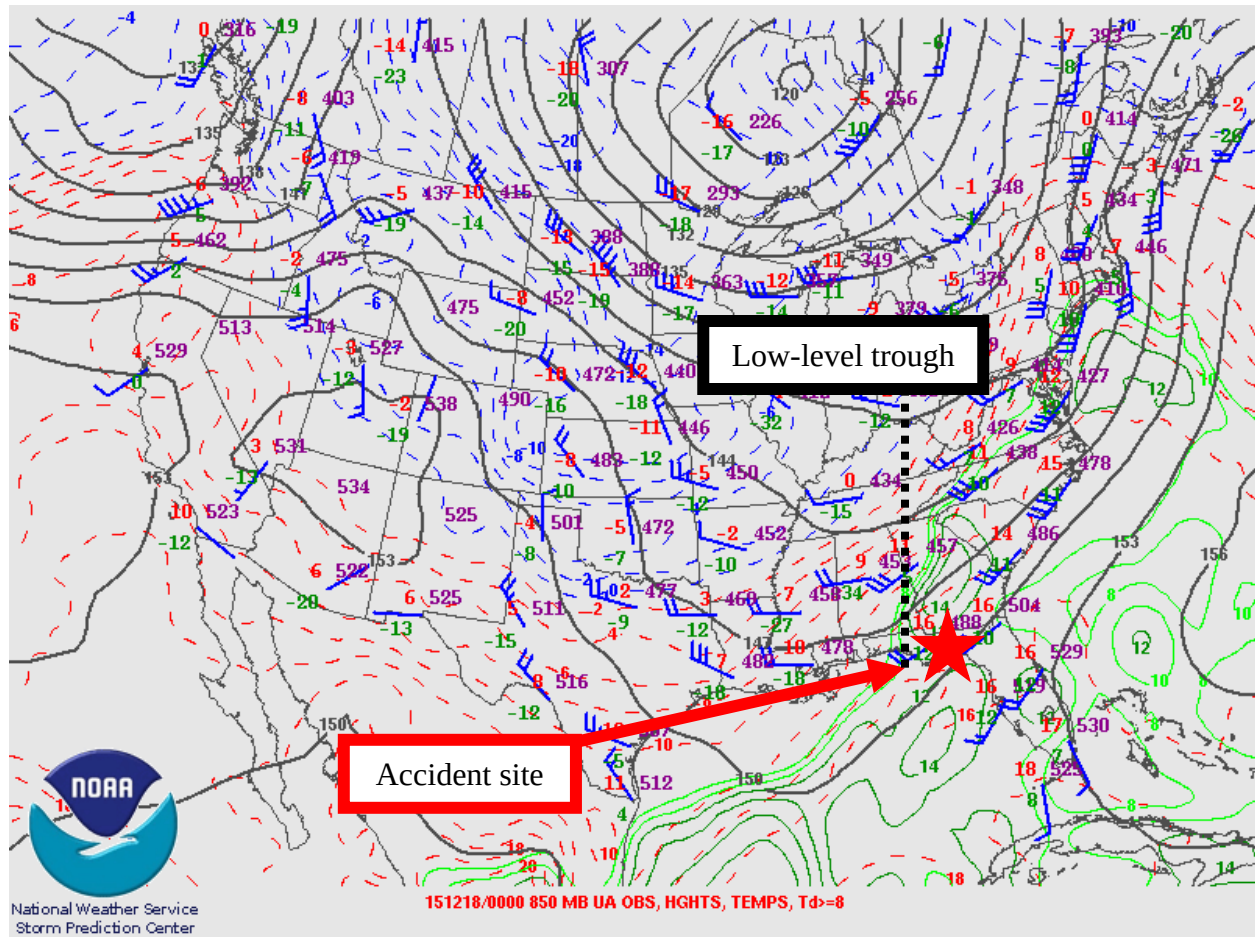


Figure 2 – 850-hPa Constant Pressure Chart for 1900 EST

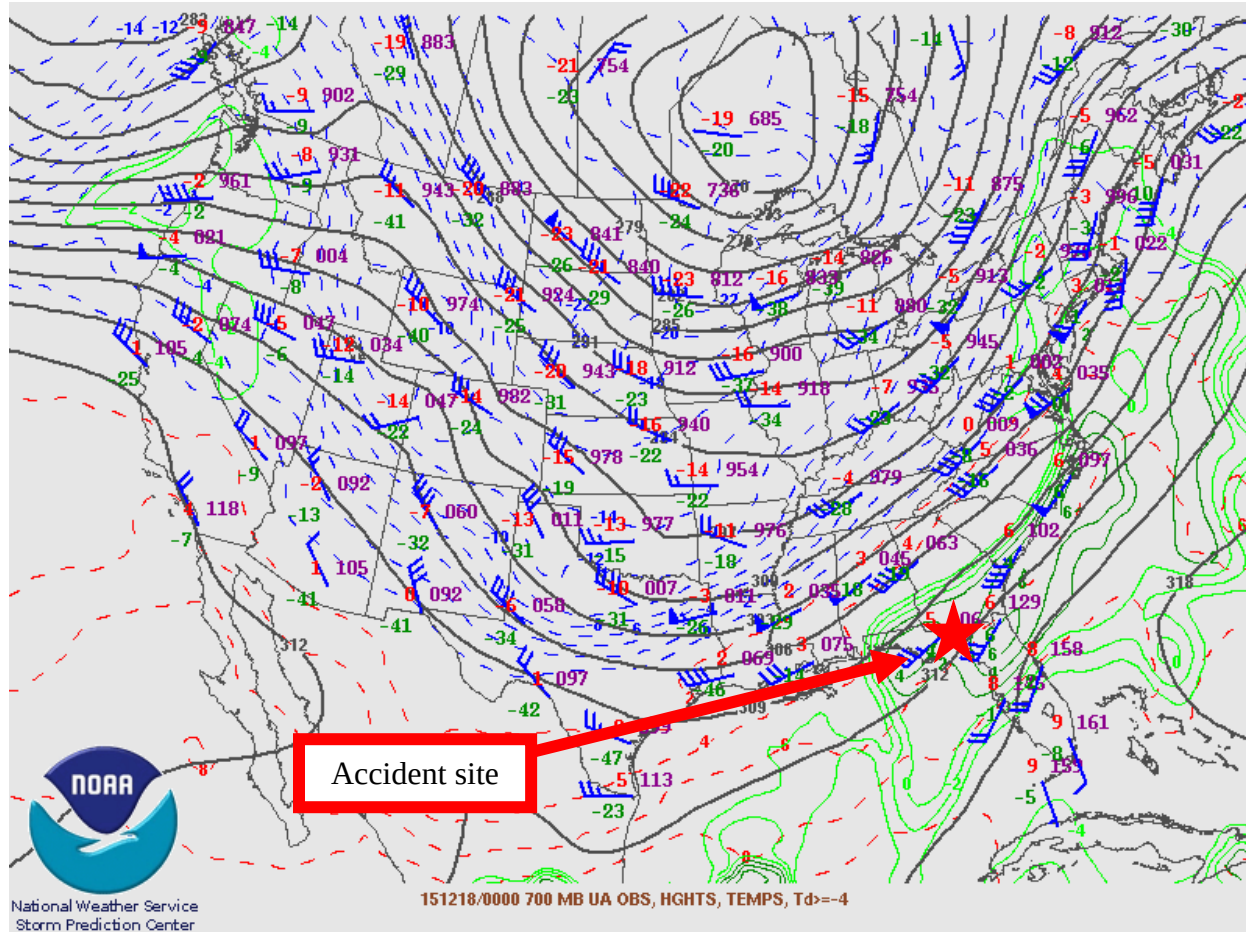


Figure 3 – 700-hPa Constant Pressure Chart for 1900 EST

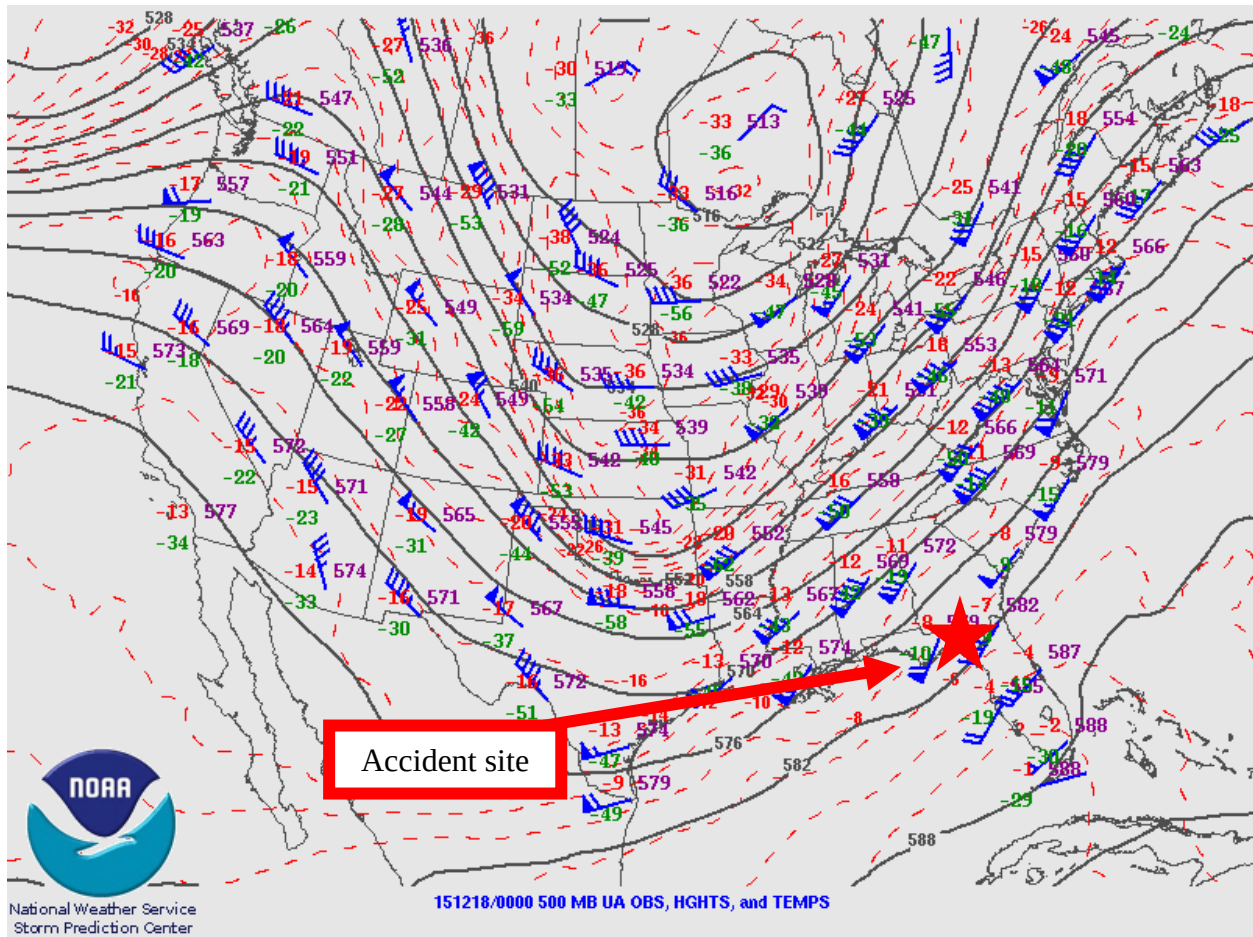


Figure 4 – 500-hPa Constant Pressure Chart for 1900 EST

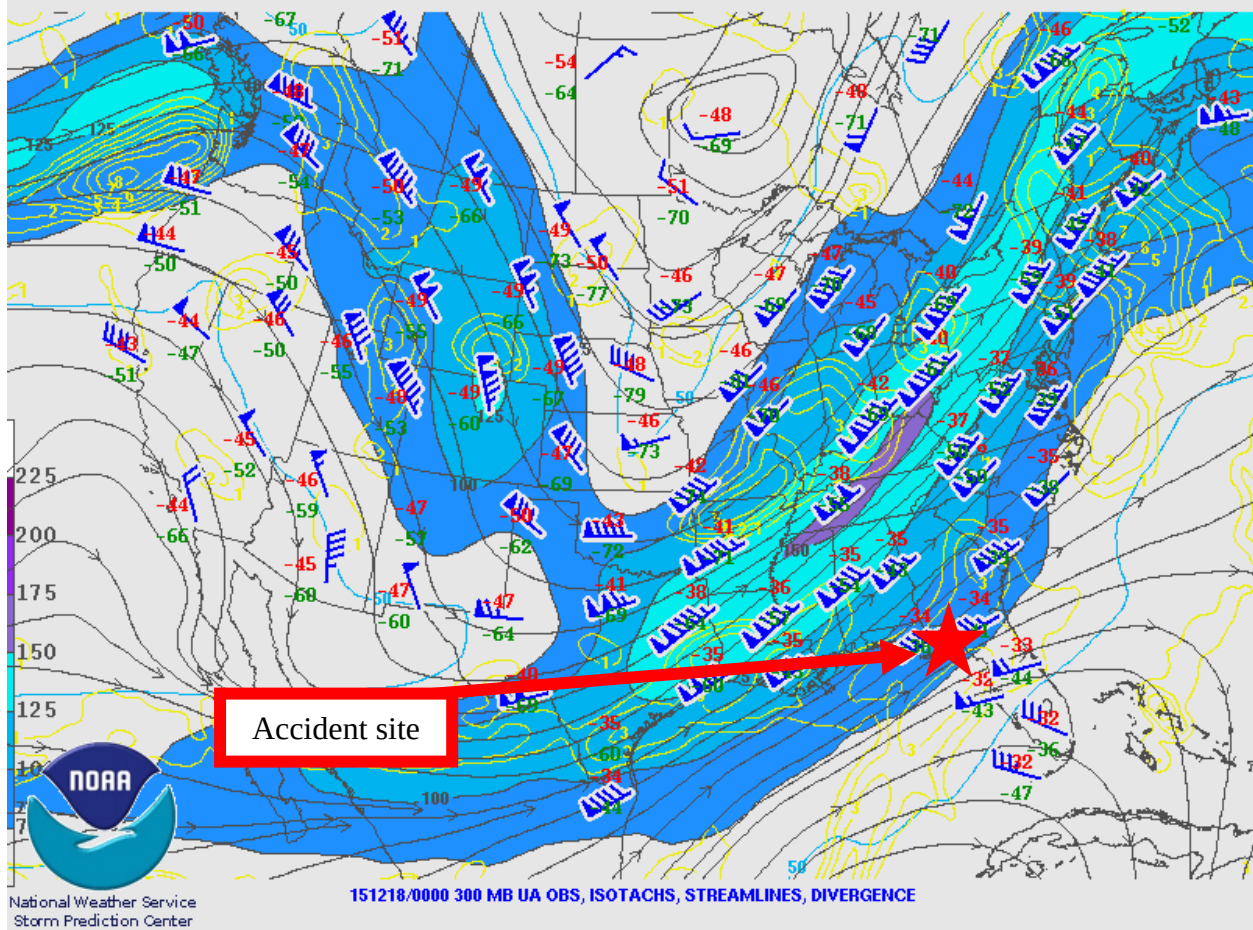


Figure 5 – 300-hPa Constant Pressure Chart for 1900 EST

2.0 Storm Prediction Center Products

SPC issued the following Day 1 Convective Outlook at 1438 EST (figure 6) with areas of thunderstorms and a marginal risk for severe thunderstorm forecast for the accident site at the accident time. The accident site was located in an area where SPC forecasted a 5 percent chance of damaging thunderstorm winds or wind gusts 50 knots or greater within 25 miles of a point, and a 2 percent chance of a tornado within 25 miles of a point (figures 7 and 8). All these severe weather chances are relatively high given that on a normal winter day no thunderstorms would be forecast for the accident area:³

SPC AC 171938

DAY 1 CONVECTIVE OUTLOOK
NWS STORM PREDICTION CENTER NORMAN OK
0138 PM CST THU DEC 17 2015

VALID 172000Z - 181200Z

³ The bold sections in this NWS product and the rest of products in the weather study report are to highlight the individual sections that directly reference the weather conditions that are or will affect the accident location around the accident time.

...THERE IS A MRGL RISK OF SVR TSTMS ACROSS PARTS OF NRN FL...SCNTRL
TO SE GA...ERN SC AND SE NC...

...SUMMARY...

SHOWERS AND THUNDERSTORMS CAPABLE OF LOCALLY STRONG WIND GUSTS AND
PERHAPS A BRIEF TORNADO WILL AFFECT LOCATIONS FROM THE EASTERN
CAROLINAS TO THE FLORIDA BIG BEND TODAY.

NO CHANGES ARE MADE TO THE OUTLOOK FOR THIS ISSUANCE.

..BROYLES.. 12/17/2015

.PREV DISCUSSION... /ISSUED 1029 AM CST THU DEC 17 2015/

...NE GULF COAST TO THE CAROLINAS THROUGH TONIGHT...

A MIDDLELEVEL TROUGH OVER THE CENTRAL CONUS WILL CONTINUE TO PROGRESS
SLOWLY EWD AS AN INITIAL SPEED MAX ACCELERATES NEWD FROM THE TN/OH
VALLEY TO NEW ENGLAND...AND AN UPSTREAM SHORTWAVE TROUGH OVER THE
HIGH PLAINS MOVES TO THE MS VALLEY. AN ASSOCIATED SURFACE COLD
FRONT WILL MOVE SLOWLY EWD ACROSS THE SRN APPALACHIANS THROUGH
TONIGHT. SOME CONVECTION...**INCLUDING ISOLATED THUNDERSTORMS...WILL
BE FOCUSED WITHIN THE WARM CONVEYOR BELT FROM THE NE GULF COAST TO
THE CAROLINAS THROUGH TONIGHT.**

WIDESPREAD CLOUDS/RAIN ASSOCIATED WITH A LEAD SPEED MAX/MCV OVER SC
WILL SLOW INLAND PENETRATION OF THE WARM/MOIST SECTOR ACROSS NC
TODAY. **SOMEWHAT STRONGER SURFACE HEATING WILL OCCUR FARTHER S IN
OCCASIONAL CLOUD BREAKS FROM THE ERN FL PANHANDLE NEWD ACROSS SE GA
AND COASTAL SC..BUT BUOYANCY OVERALL SHOULD REMAIN MODEST /MUCAPE OF
500-1500 J PER KG/. WITH NO SUBSTANTIAL CYCLOGENESIS EXPECTED AND
THE STRONGEST FLOW EXPECTED TO REMAIN ABOVE THE LINGERING SHALLOW
COOL AIR MASS ACROSS THE CAROLINAS...LOW-LEVEL FLOW/SHEAR WITHIN THE
WARM SECTOR WILL NOT BE PARTICULARLY STRONG. **THUS...THE STORM
ENVIRONMENT APPEARS TO BE ONLY marginally SUPPORTIVE OF SMALL BOWING
SEGMENTS AND/OR WEAK EMBEDDED SUPERCELL STRUCTURES. AS SUCH...WILL
MAINTAIN THE MARGINAL RISK AREA BASED ON LOW DAMAGING AND TORNADO
PROBABILITIES.****

CLICK TO GET WUUS01 PTSDY1 PRODUCT

NOTE: THE NEXT DAY 1 OUTLOOK IS SCHEDULED BY 0100Z

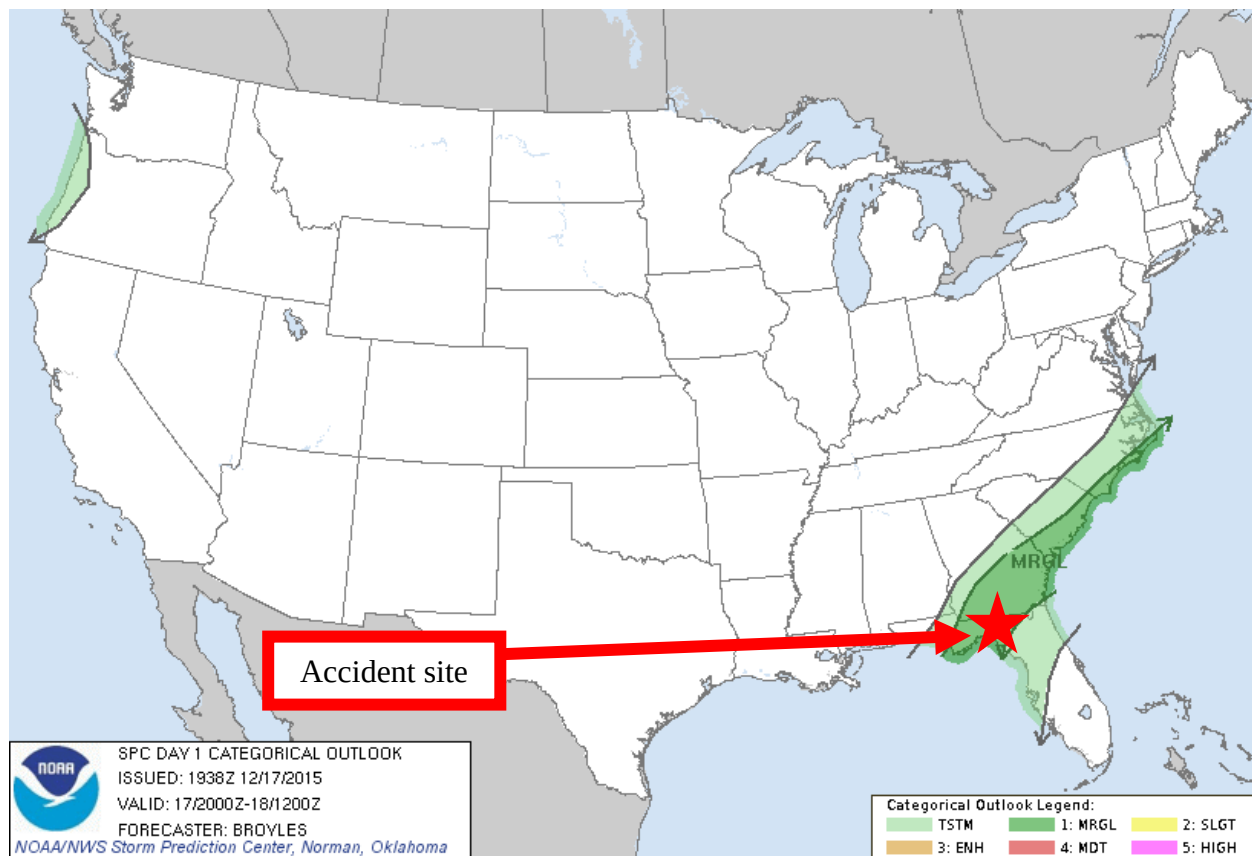


Figure 6 – Storm Prediction Center day 1 Convective Outlook valid at the time of the accident

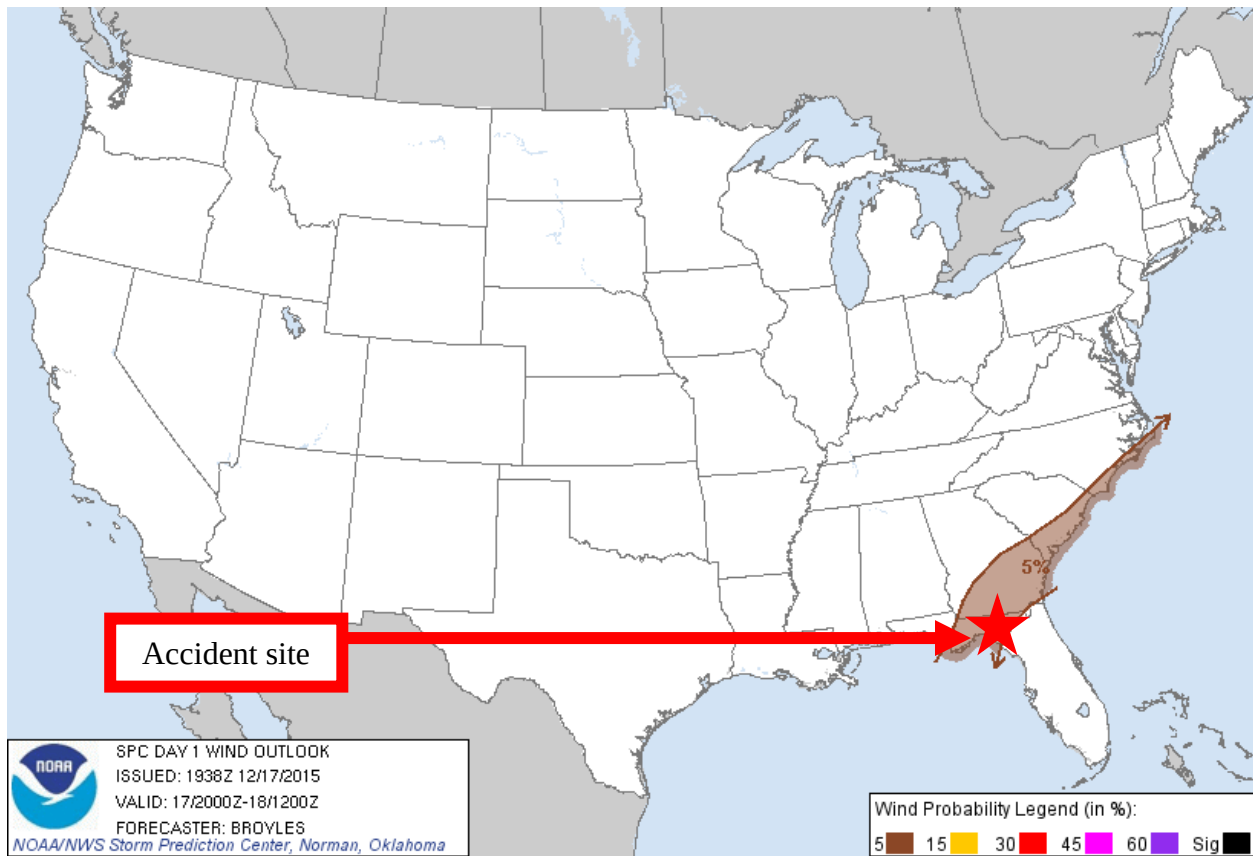


Figure 7 – Storm Prediction Center day 1 Wind Outlook valid at the time of the accident

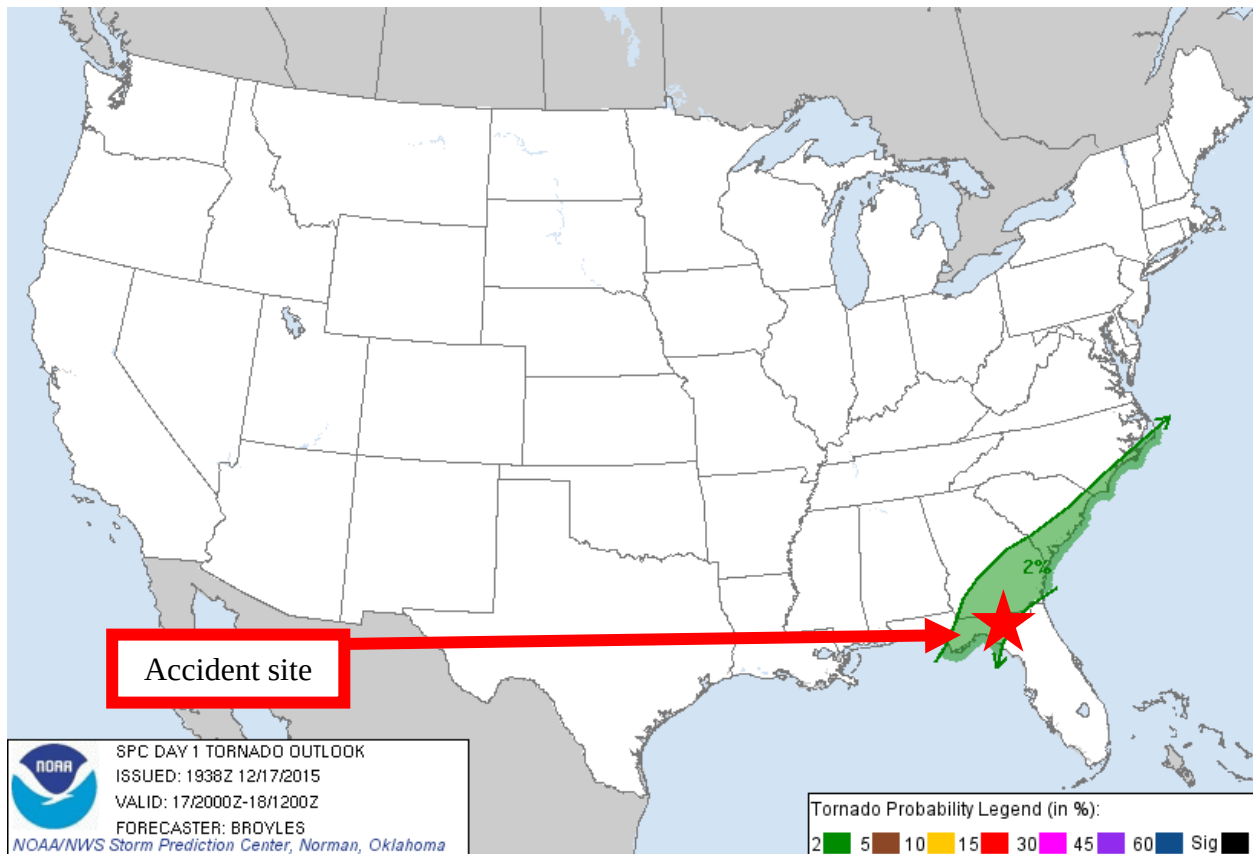


Figure 8 – Storm Prediction Center day 1 Tornado Outlook valid at the time of the accident

3.0 Surface Observations

The area surrounding the accident site was documented utilizing official NWS Meteorological Aerodrome Reports (METARs) and Specials (SPECIs). The following observations were taken from standard code and are provided in plain language.

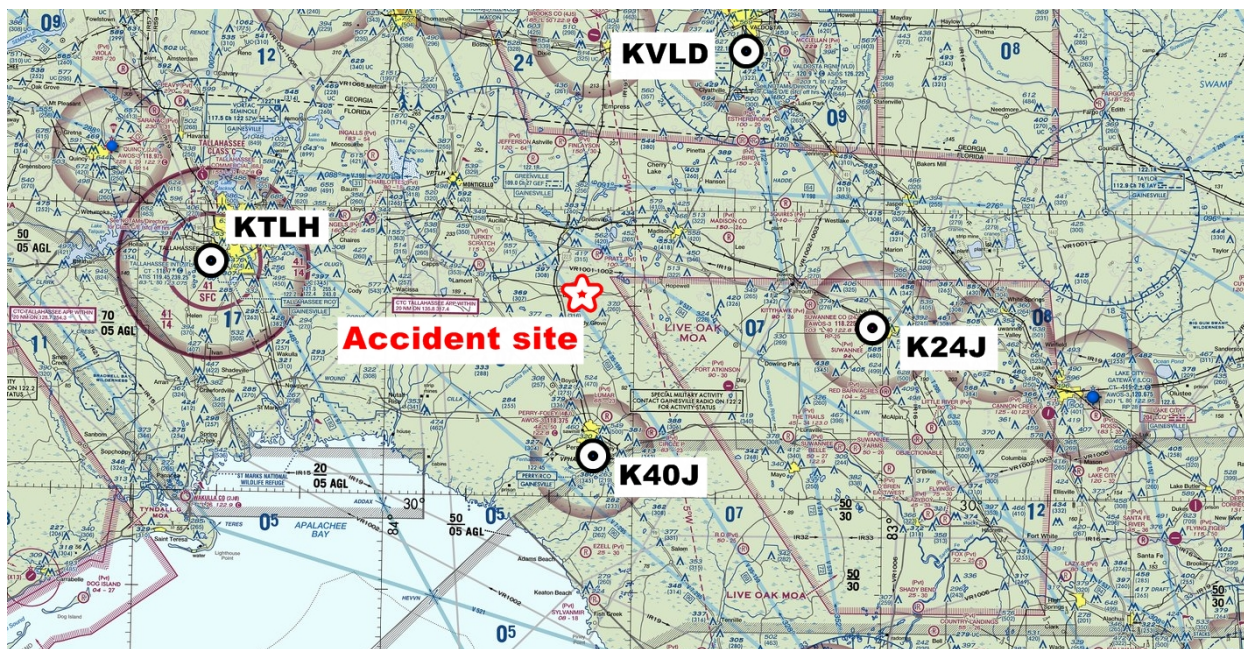


Figure 9 – Map of Florida with the location of the accident site, surface observation sites, weather radar site, and upper air sounding site

Perry-Foley Airport (K40J) was the closest official weather station to the accident site and K40J was located 3 miles south of Perry, Florida. K40J had an Automated Weather Observing System (AWOS⁴) whose reports were not supplemented. K40J was located 17 miles south of the accident site, at an elevation of 44 feet, and had a 3° westerly magnetic variation⁵ (figure 9). The following observations were taken and disseminated during the times surrounding the accident:

[1755 EST] K40J 172255Z AUTO 18004KT 10SM CLR 24/21 A2986 RMK AO2 T02350212=

[1815 EST] K40J 172315Z AUTO 12004KT 10SM SCT007 BKN013 23/21 A2986 RMK AO2 T02310211=

[1835 EST] K40J 172335Z AUTO 13005KT 10SM SCT007 BKN013 23/21 A2985 RMK AO2 T02280212=

[1855 EST] K40J 172355Z AUTO 17005KT 10SM -RA BKN007 OVC013 23/22 A2986 RMK AO2 60004 T02280215 10256 20228=

[1915 EST] K40J 180015Z AUTO 17005KT 10SM -DZ OVC007 23/22 A2986 RMK AO2 T02270215=

⁴ 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 twelve thousand feet, and altimeter setting.

⁵ Magnetic variation – The angle (at a particular location) between magnetic north and true north.

***[1935 EST] K40J 180035Z AUTO 15005KT 10SM BKN007 OVC017 23/21
A2987 RMK AO2 T02250213=***

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***[1955 EST] K40J 180055Z AUTO 14004KT 10SM BKN005 BKN015 OVC021
23/21 A2987 RMK AO2 T02250212=***

***[2015 EST] K40J 180115Z AUTO 14005KT 10SM BKN005 BKN012 OVC100
22/21 A2987 RMK AO2 T02240212=***

***[2035 EST] K40J 180135Z AUTO 15006KT 10SM BKN005 BKN012 OVC018
22/21 A2988 RMK AO2 T02230211=***

***[2055 EST] K40J 180155Z AUTO 14007KT 10SM SCT005 OVC014 22/21
A2987 RMK AO2 T02220210=***

***[2115 EST] K40J 180215Z AUTO 16005KT 10SM SCT005 OVC014 22/21
A2988 RMK AO2 T02220210=***

***[2135 EST] K40J 180235Z AUTO 16006KT 10SM OVC005 22/21 A2988 RMK
AO2 T02220210=***

K40J weather at 1915 EST was reported as wind from 170° at 5 knots, 10 miles visibility, light mist, overcast ceiling at 700 feet above ground level (agl), temperature of 23° Celsius (C), dew point temperature of 22° C, and an altimeter setting of 29.86 inches of mercury. Remarks: automated station with precipitation discriminator, temperature 22.7° C, dew point temperature 21.5° C.

K40J weather at 1935 EST was reported as wind from 150° at 5 knots, 10 miles visibility, a broken ceiling at 700 feet agl, overcast skies at 1,700 feet agl, temperature of 23° C, dew point temperature of 21° C, and an altimeter setting of 29.87 inches of mercury. Remarks: automated station with precipitation discriminator, temperature 22.5° C, dew point temperature 21.3° C.

K40J weather at 1955 EST was reported as wind from 140° at 4 knots, 10 miles visibility, a broken ceiling at 500 feet agl, broken skies at 1,500 feet agl, overcast skies at 2,100 feet agl, temperature of 23° C, dew point temperature of 21° C, and an altimeter setting of 29.87 inches of mercury. Remarks: automated station with precipitation discriminator, temperature 22.5° C, dew point temperature 21.2° C.

K40J weather at 2015 EST was reported as wind from 140° at 5 knots, 10 miles visibility, a broken ceiling at 500 feet agl, broken skies at 1,200 feet agl, overcast skies at 10,000 feet agl, temperature of 22° C, dew point temperature of 21° C, and an altimeter setting of 29.87 inches of mercury. Remarks: automated station with precipitation discriminator, temperature 22.4° C, dew point temperature 21.2° C.

Suwannee County Airport (K24J) was the closest official airport to the east of the accident site and was located 2 miles west of Live Oak, Florida. K24J had an AWOS, was located 31 miles east-southeast of the accident site, at an elevation of 103 feet, and had a 5° westerly magnetic variation (figure 9). No sky cover was reported from K24J as K24J had no working sky cover instrumentation at the time of the accident. The sky cover instrumentation was fixed by February 29, 2016. The following observations were taken and disseminated during the times surrounding the accident:

[1755 EST] K24J 172355Z AUTO 15003KT 10SM 23/23 A2988 RMK AO1=

[1815 EST] K24J 180015Z AUTO 16004KT 10SM 23/23 A2988 RMK AO1=

[1835 EST] K24J 180035Z AUTO 15004KT 10SM 22/22 A2988 RMK AO1=

[1855 EST] K24J 180055Z AUTO 15005KT 8SM 22/22 A2989 RMK AO1=

[1915 EST] K24J 180115Z AUTO 16004KT 9SM 22/22 A2988 RMK AO1=

[1935 EST] K24J 180135Z AUTO 18003KT 10SM 22/22 A2990 RMK AO1=

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[1955 EST] K24J 180155Z AUTO 18004KT 10SM 22/22 A2989 RMK AO1=

[2015 EST] K24J 180215Z AUTO 18004KT 9SM 22/22 A2989 RMK AO1=

[2035 EST] K24J 180235Z AUTO 18004KT 10SM 22/22 A2989 RMK AO1=

[2055 EST] K24J 180255Z AUTO 18004KT 8SM 22/22 A2989 RMK AO1=

K24J weather at 1915 EST was reported as wind from 160° at 4 knots, 9 miles visibility, temperature of 22° C, dew point temperature of 22° C, and an altimeter setting of 29.88 inches of mercury. Remarks: automated station without a precipitation discriminator.

K24J weather at 1935 EST was reported as wind from 180° at 3 knots, 10 miles visibility, temperature of 22° C, dew point temperature of 22° C, and an altimeter setting of 29.90 inches of mercury. Remarks: automated station without a precipitation discriminator.

K24J weather at 1955 EST was reported as wind from 180° at 4 knots, 10 miles visibility, temperature of 22° C, dew point temperature of 22° C, and an altimeter setting of 29.89 inches of mercury. Remarks: automated station without a precipitation discriminator.

K24J weather at 2015 EST was reported as wind from 180° at 4 knots, 9 miles visibility, temperature of 22° C, dew point temperature of 22° C, and an altimeter setting of 29.89 inches of mercury. Remarks: automated station without a precipitation discriminator.

Valdosta Regional Airport (KVLD) was the closest official airport to the north of the accident site and was located 3 miles south of Valdosta, Georgia. KVLD had an Automated Surface Observing System (ASOS)⁶ whose reports were not supplemented. KVLD was located 31 miles northeast of the accident site, at an elevation of 203 feet, and had a 5° westerly magnetic variation (figure 9). The following observations were taken and disseminated during the times surrounding the accident:

[1753 EST] KVLD 172253Z AUTO 00000KT 6SM BR BKN017 BKN022 OVC034
22/22 A2984 RMK AO2 SLP111 T02220217=

[1823 EST] KVLD 172323Z AUTO 00000KT 9SM BKN013 BKN018 OVC025
22/22 A2985 RMK AO2 T02170217=

[1837 EST] KVLD 172337Z AUTO 00000KT 6SM BR FEW006 OVC013 22/22
A2984 RMK AO2 T02170217=

[1853 EST] KVLD 172353Z AUTO 00000KT 9SM BKN008 OVC015 22/22 A2984
RMK AO2 SLP111 60025 T02170217 10250 20217 51005=

**[1927 EST] KVLD 180027Z AUTO 00000KT 8SM BKN011 OVC016 22/22 A2985
RMK AO2 T02170217=**

**[1938 EST] KVLD 180038Z AUTO 00000KT 6SM -RA BR BKN008 OVC013
22/22 A2985 RMK AO2 RAB29 CIG 006V011 P0000 T02170217=**

ACCIDENT TIME 1943 EST

**[1953 EST] KVLD 180053Z AUTO 17005KT 9SM -RA OVC007 22/22 A2984
RMK AO2 RAB29 CIG 006V011 SLP112 P0000 T02170217=**

**[2020 EST] KVLD 180120Z AUTO 19005KT 10SM FEW007 OVC010 22/22
A2986 RMK AO2 RAE02 P0000 T02220222=**

[2040 EST] KVLD 180140Z AUTO 20003KT 10SM -RA BKN007 OVC012 22/22
A2985 RMK AO2 RAE02B24 P0000 T02220222=

[2053 EST] KVLD 180153Z AUTO 18004KT 7SM -RA BKN006 OVC012 22/22
A2985 RMK AO2 RAE02B24 SLP115 P0000 T02220222=

KVLD weather at 1927 EST was reported as wind calm, 8 miles visibility, a broken ceiling at 1,100 feet agl, overcast skies at 1,600 feet agl, temperature of 22° C, dew point temperature of 22° C, and an altimeter setting of 29.85 inches of mercury. Remarks: automated station with precipitation discriminator, temperature 21.7° C, dew point temperature 21.7° C.

⁶ ASOS – Automated Surface Observing System is equipped with meteorological instruments to observe and report wind, visibility, ceiling, temperature, dewpoint, altimeter, and barometric pressure.

KVLD weather at 1938 EST was reported as wind calm, 6 miles visibility, light rain and mist, a broken ceiling at 800 feet agl, overcast skies at 1,300 feet agl, temperature of 22° C, dew point temperature of 22° C, and an altimeter setting of 29.85 inches of mercury. Remarks: automated station with precipitation discriminator, rain began at 1929 EST, ceiling varying between 600 feet and 1,100 feet agl, one-hourly precipitation of a trace, temperature 21.7° C, dew point temperature 21.7° C.

KVLD weather at 1953 EST was reported as wind from 170° at 5 knots, 9 miles visibility, light rain, an overcast ceiling at 700 feet agl, temperature of 22° C, dew point temperature of 22° C, and an altimeter setting of 29.84 inches of mercury. Remarks: automated station with precipitation discriminator, rain began at 1929 EST, ceiling varying between 600 feet and 1,100 feet agl, sea-level pressure of 1011.2 hPa, one-hourly precipitation of a trace, temperature 21.7° C, dew point temperature 21.7° C.

KVLD weather at 2020 EST was reported as wind from 190° at 5 knots, 10 miles visibility, few clouds at 700 feet agl, an overcast ceiling at 1,000 feet agl, temperature of 22° C, dew point temperature of 22° C, and an altimeter setting of 29.86 inches of mercury. Remarks: automated station with precipitation discriminator, rain ended at 2002 EST, one-hourly precipitation of a trace, temperature 22.2° C, dew point temperature 22.2° C.

The observations from K40J and KVLD indicated that IFR⁷ ceilings were present around the accident area around an hour before the accident time. These lower ceilings were likely associated with the cold front and rain shower activity (section 6.4) moving eastward across northern Florida around the accident time. The accident flight likely encountered IMC while flying at the end of the accident flight.

4.0 Upper Air Data

The closest official upper air sounding to the accident site was from Tallahassee, Florida, (KTLH), located 38 miles west of the accident site, with a site number 72214, and an elevation of 83 feet (figure 9). The 1900 EST sounding from KTLH was plotted on a standard Skew-T log P diagram⁸ with the derived stability parameters included in figure 10 (with data from the surface to 600-hPa, or 14,000 feet msl.) This data was analyzed utilizing the RAOB⁹ software package. The sounding depicted the Lifted Condensation Level (LCL)¹⁰ at 777 feet msl, a Convective Condensation Level (CCL)¹¹ of 3,414 feet, and a Level of Free Convection (LFC)¹² at 2,042 feet. The freezing level was located at 13,857 feet msl. The precipitable water value was 1.80 inches.

⁷ Instrument Flight Rules – Refers to the general weather conditions pilots can expect at the surface. IFR criteria means a ceiling below 1,000 feet agl and/or less than 3 miles visibility.

⁸ 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.

⁹ RAOB – (The complete Rawinsonde Observation program) is an interactive sounding analysis program developed by Environmental Research Services, Matamoras, Pennsylvania.

¹⁰ Lifting Condensation Level (LCL) - The height at which a parcel of moist air becomes saturated when it is lifted dry adiabatically.

¹¹ Convective Condensation Level (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.

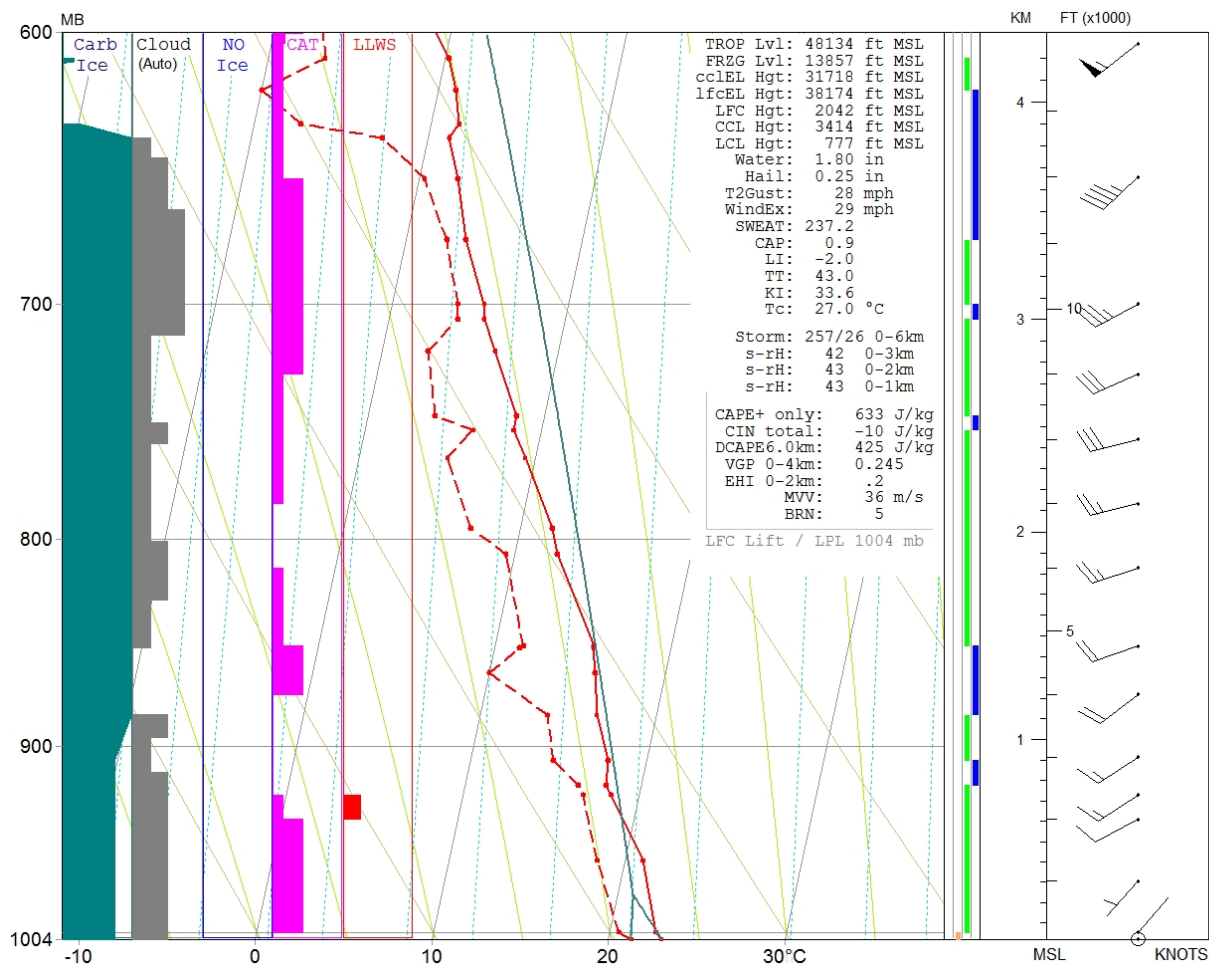


Figure 10 – 1900 EST KTLH sounding

The 1900 EST KTLH sounding indicated a relatively moist vertical environment from the surface through 14,000 feet msl with layers of conditional instability. There was 633 J/kg of CAPE¹³ lifting a parcel from the ground. This environment would have been supportive of cloud formation, rain showers, and thunderstorms, especially with the lifting mechanisms in the area of the accident site at the accident time (sections 1.1 and 1.2). The maximum vertical velocity (MVV) possible within rain showers or thunderstorm updrafts was 36 meters per second (m/s) or 70 knots. RAOB indicated several layers of cloud cover from the surface through 13,000 feet msl with no icing conditions below 14,000 feet msl. Given the lifting mechanisms in the area of the accident site at the accident time (sections 1.1 and 1.2) and unstable environment (figure 10), cloud layers and precipitation would have been expected on the accident day and at the accident time.

¹² Level of Free Convection (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.

¹³ Convective Available Potential Energy (CAPE) – CAPE is a measure of the amount of energy available for convection and is directly related to the maximum potential vertical speed within an updraft.

The sounding wind profile indicated there was a calm surface wind with the wind becoming southwesterly by 1,000 feet msl at 5 knots. The wind remained out of the southwest to west through 14,000 feet msl. There was an increase in wind speed from 5 knots at 1,000 feet msl to 55 knots by 14,000 feet msl. Low-level wind shear (LLWS) was indicated by RAOB in a small layer between 2,000 and 3,000 feet msl. Several layers of possible clear-air turbulence were identified by RAOB from the surface through 14,000 feet. While there was a small amount of LLWS and some clear-air turbulence, any turbulence or wind shear conditions experienced by the accident flight would have likely occurred due to the rain shower and thunderstorm activity across northern Florida around the accident time.

5.0 Satellite Data

Visible and infrared data from the Geostationary Operational Environmental Satellite number 13 (GOES-13) was obtained from an archive at the Space Science Engineering Center (SSEC) at the University of Wisconsin-Madison (UW) in Madison, Wisconsin, and processed using the Safety Board's Man-computer Interactive Data Access System (McIDAS) software. Visible and infrared imagery (GOES-13 bands 1, 2, and 4) at a wavelength of 0.65 microns (μm), 3.9 μm , and 10.7 μm retrieved brightness temperatures for the scene. Satellite imagery surrounding the time of the accident, from 1600 EST through 2200 EST at approximately 15-minute intervals, were reviewed and the closest images to the time of the accident are documented here.

Figures 11, 12, and 13 present the GOES-13 infrared imagery from 1915, 1945, and 2000 EST at 4X magnification with the accident site highlight with a red mark. The cloud cover is moving from west to east across the accident area at the accident time. The higher cloud tops (green and blue colors) are located across southern Georgia and west of Tampa Bay, Florida, in the eastern Gulf of Mexico. Based on the brightness temperatures above the accident site and the vertical temperature profile provided by the 1900 EST KTLH sounding, the approximate cloud-top heights over the accident site were 22,000 feet msl at 1945 EST.

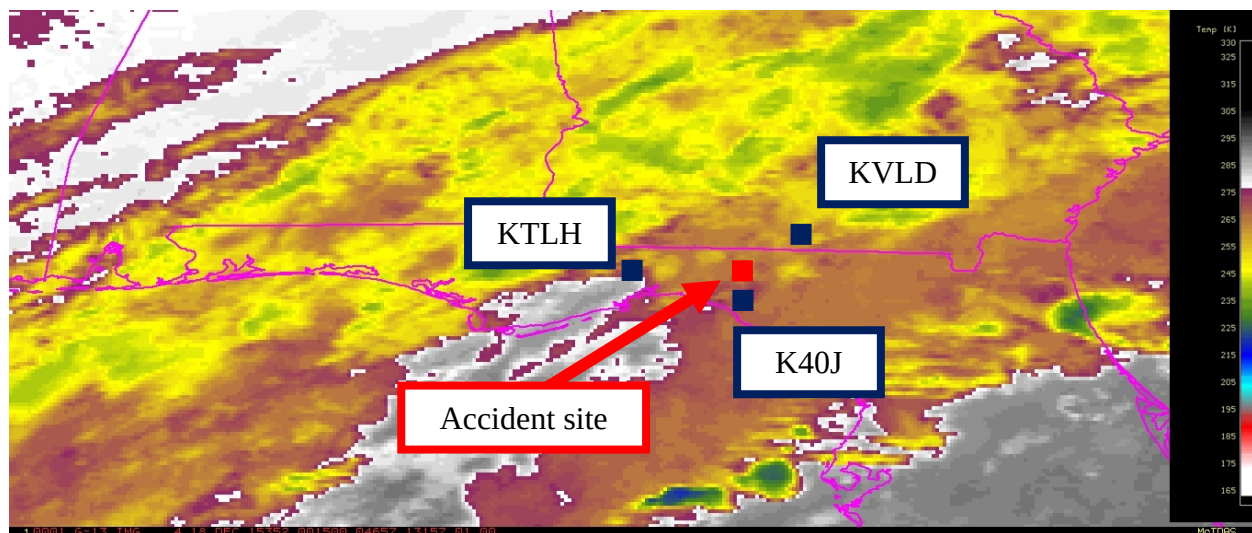


Figure 11 – GOES-13 infrared image at 1915 EST

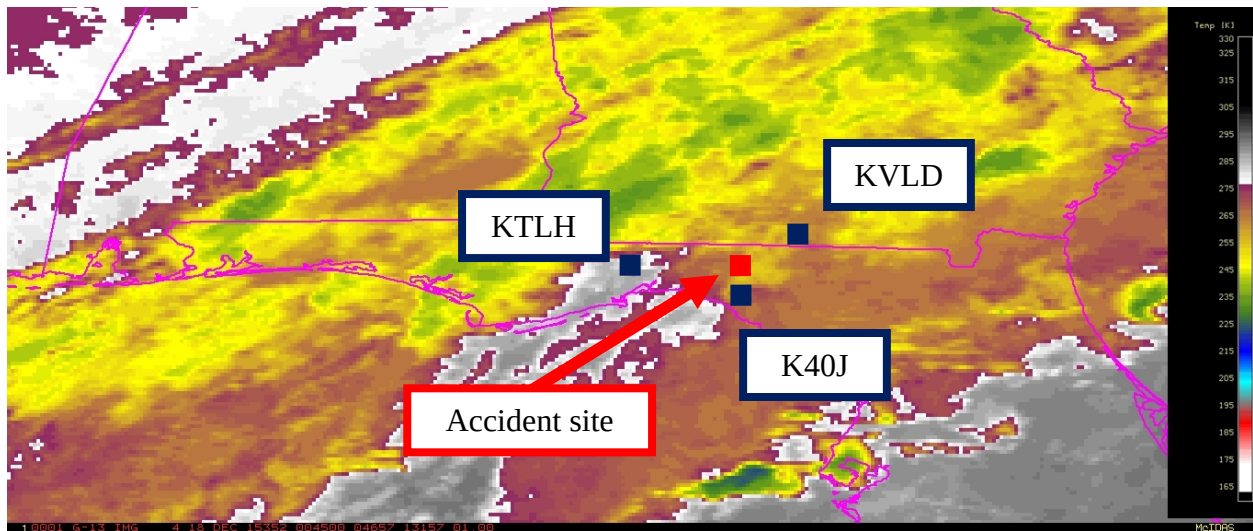


Figure 12 – GOES-13 infrared image at 1945 EST

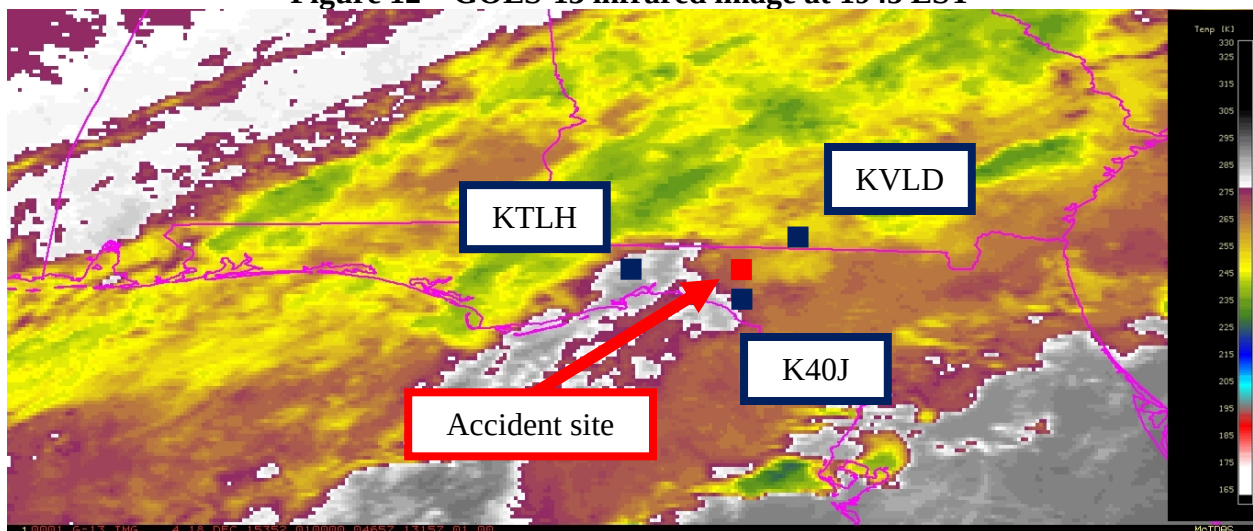


Figure 13 – GOES-13 infrared image at 2000 EST

6.0 Radar Imagery Information

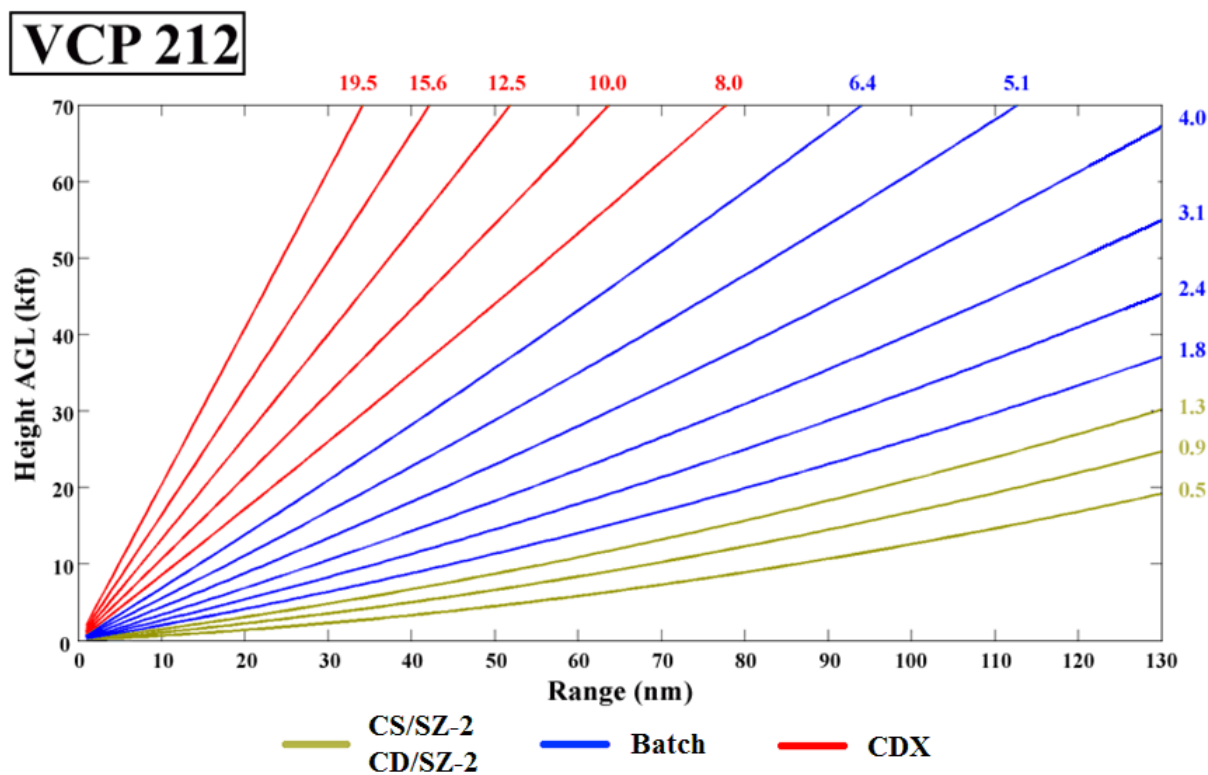
The closest NWS Weather Surveillance Radar-1988, Doppler (WSR-88D)¹⁴ was KTLH. Level II and III archive radar data was obtained from the NCEI utilizing the NEXRAD Data Inventory Search and displayed using the NOAA's Weather and Climate Toolkit software.

¹⁴ 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.

6.1 Volume Scan Strategy

The WSR-88D is a computer-controlled radar system, which automatically creates a complete series of specific scans in a specific sequence known as a volume scan. Individual elevation scans are immediately available on the WSR-88D's Principle Users Processor (PUP). Products that require data from multiple elevation scans are not available until the end of the five to ten minute volume scan.

The WSR-88D operates in several different scanning modes, identified as Mode A and Mode B. Mode A is the precipitation scan and has three common scanning strategies. The most common is where the radar makes 14 elevation scans from 0.5° to 19.5° every four and a half minutes. This particular scanning strategy is documented as volume coverage pattern 212 (VCP-212). Mode B is the clear-air mode, where the radar makes 5 elevation scans during a ten minute period. During the period surrounding the accident, the KTLH WSR-88D radar was operating in the precipitation mode (Mode A, VCP-212). The following chart 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.



VCP-212 Precipitation Mode Scan Strategy

6.2 Beam Height Calculation

Assuming standard refraction¹⁵ of the WSR-88D 0.95° wide radar beam, the following table shows the approximate beam height and width¹⁶ information¹⁷ of the radar display over the site of the accident. The heights have been rounded to the nearest 10 feet.

ANTENNA ELEVATION	BEAM CENTER	BEAM BASE	BEAM TOP	BEAM WIDTH
0.5°	3,120 feet	1,240 feet	4,990 feet	3,750 feet

Based on the radar height calculations, the 0.5° elevation scan depicted the conditions between 1,240 feet and 4,990 feet msl over the accident site at the accident time and these are the closest altitudes to the accident site.¹⁸

6.3 Reflectivity

Reflectivity is the measure of the efficiency of a target in intercepting and returning radio energy. With hydrometeors¹⁹ 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 decibels (dBZ²⁰), and is a general measure of echo intensity. The chart below relates the NWS video integrator and processor (VIP) intensity levels versus the WSR-88D's display levels, precipitation mode reflectivity in decibels, and rainfall rates.

¹⁵ Standard Refraction in the atmosphere is when the temperature and humidity distributions are approximately average, and values set at the standard atmosphere.

¹⁶ Beam width – A measure of the angular width of a radar beam.

¹⁷ Beamwidth values are shown for legacy resolution products. Super resolution products would an effective beamwidth that would be approximately half these values.

¹⁸ For more information see the ATC data contained in the docket for this accident.

¹⁹ 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.

²⁰ 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.

NWS VIP/DBZ CONVERSION TABLE

NWS VIP	WSR-88D LEVEL	PREC MODE DBZ	RAINFALL
0	0	< 5	
	1	5 to 9	
	2	10 to 14	
1 Very Light	3	15 to 19	.01 in/hr
	4	20 to 24	.02 in/hr
	5	25 to 29	.04 in/hr
2 Light to Moderate	6	30 to 34	.09 in/hr
	7	35 to 39	.21 in/hr
3 Strong	8	40 to 44	.48 in/hr
4 Very Strong	9	45 to 49	1.10 in/hr
5 Intense	10	50 to 54	2.49 in/hr
6 Extreme	11	55 to 59	>5.67 in/hr
	12	60 to 64	
	13	65 to 69	
	14	70 to 74	
	15	> 75	

FAA Advisory Circular AC 00-24C, “Thunderstorms,” dated February 19, 2013, 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 but less than 50 dBZ, inclusive. Finally, any dBZ values above 50 dBZ shall be described as “extreme.” From the NWS, precipitation conditions at the surface can be inferred from VIP Levels described in the chart below:

- VIP 1 (Level 1, 18-30 dBZ) - Light precipitation
- VIP 2 (Level 2, 30-38 dBZ) - Light to moderate rain.
- VIP 3 (Level 3, 38-44 dBZ) - Moderate to heavy rain.
- VIP 4 (Level 4, 44-50 dBZ) - Heavy rain
- VIP 5 (Level 5, 50-57 dBZ) - Very heavy rain; hail possible.

VIP 6 (Level 6, >57 dBZ) - Very heavy rain and hail; large hail possible.

6.4 Base Reflectivity and Lightning Data

Figures 14, 15, 16, and 17 present the KTLH WSR-88D base reflectivity images for the 0.5° with a resolution of 0.5° X 250 m at 1940, 1941, 1944, and 1946 EST. The accident flight flew through base reflectivity values between 0 and 15 dBZ at the accident time. These base reflectivity values are consistent with light precipitation (drizzle and light rain) at the accident site at the accident time and are consistent with likely IMC at the accident flight level at the accident time (section 3.0). There were no lightning strikes near the accident site at the accident time.

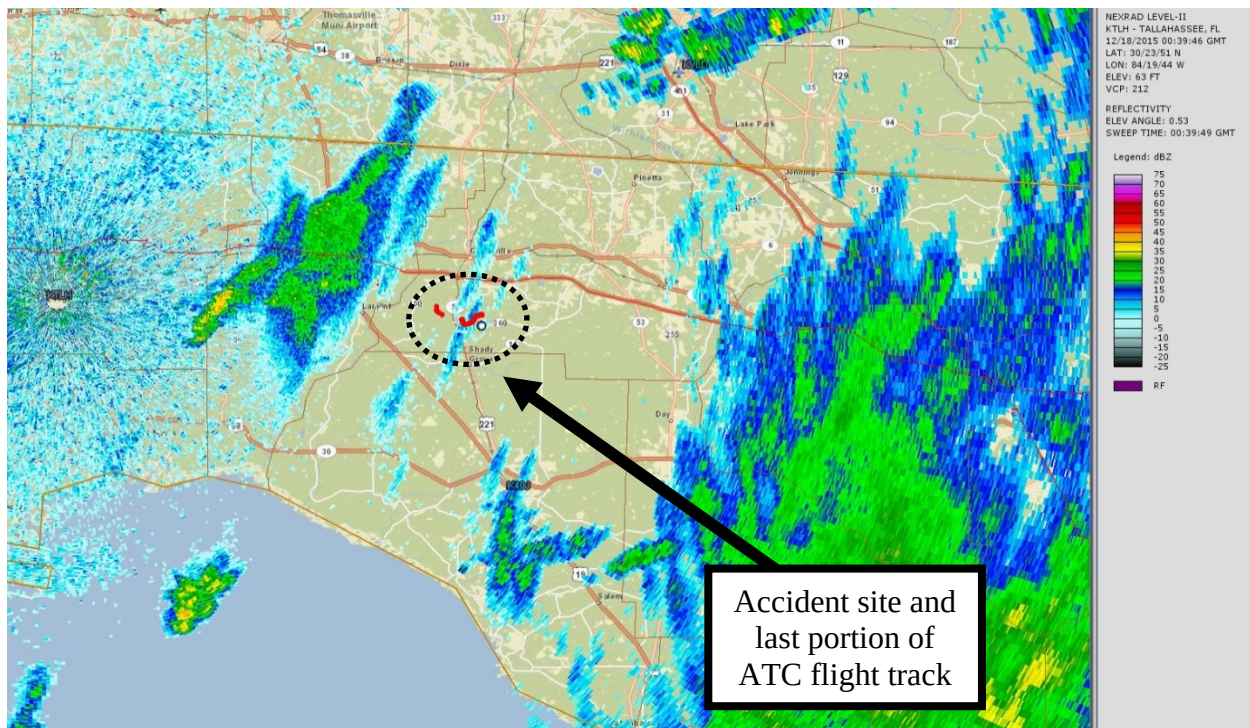


Figure 14 – KTLH WSR-88D reflectivity for the 0.5° elevation scan initiated at 1940 EST with accident flight track

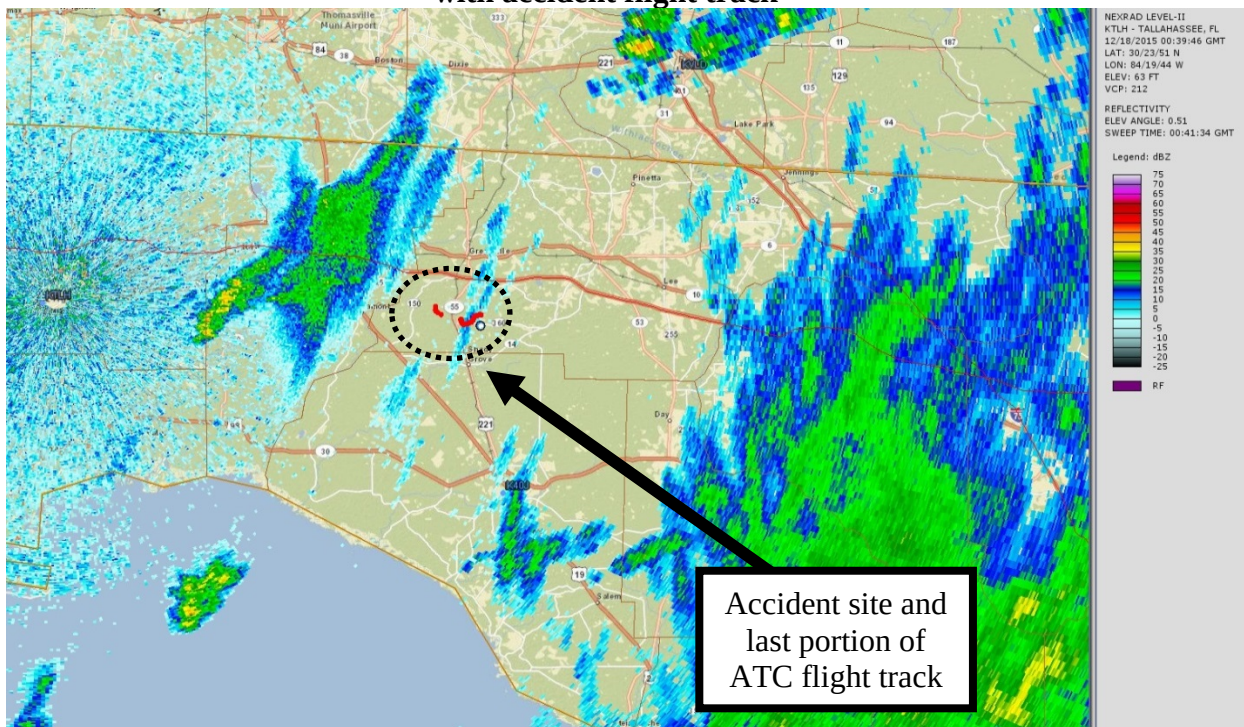


Figure 15 – KTLH WSR-88D reflectivity for the 0.5° elevation scan initiated at 1941 EST with accident flight track

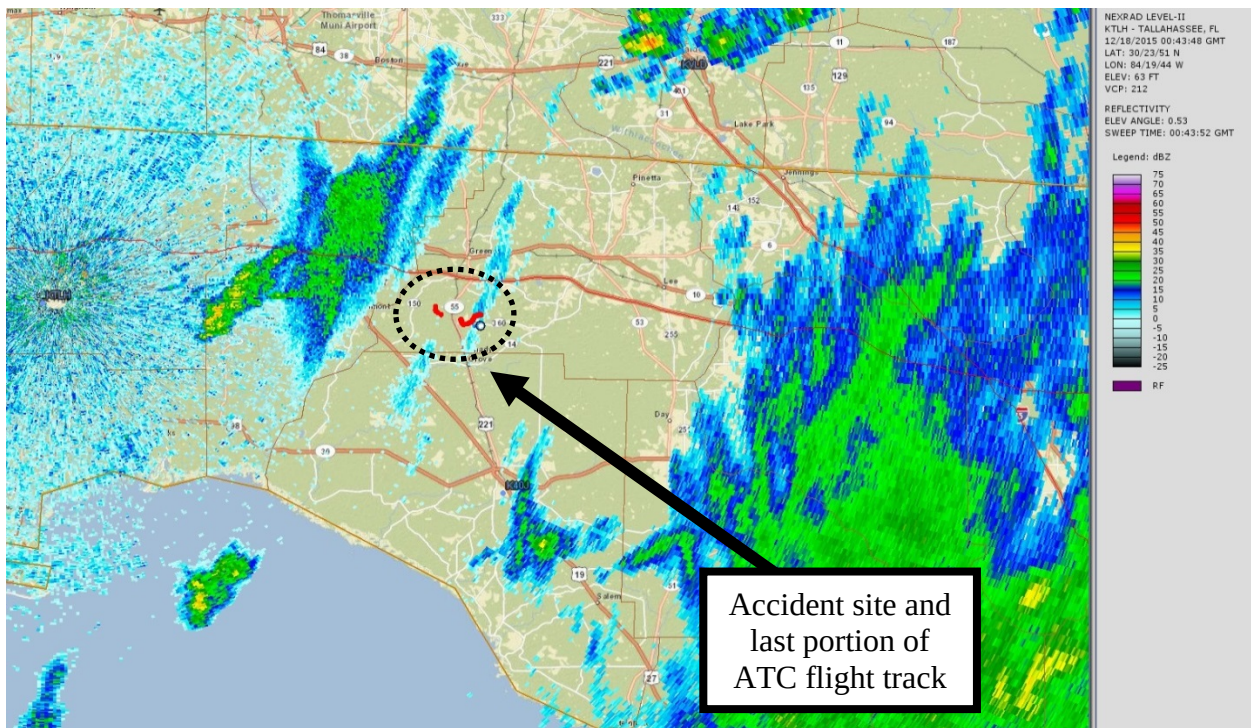


Figure 16 – KTLH WSR-88D reflectivity for the 0.5° elevation scan initiated at 1944 EST with accident flight track

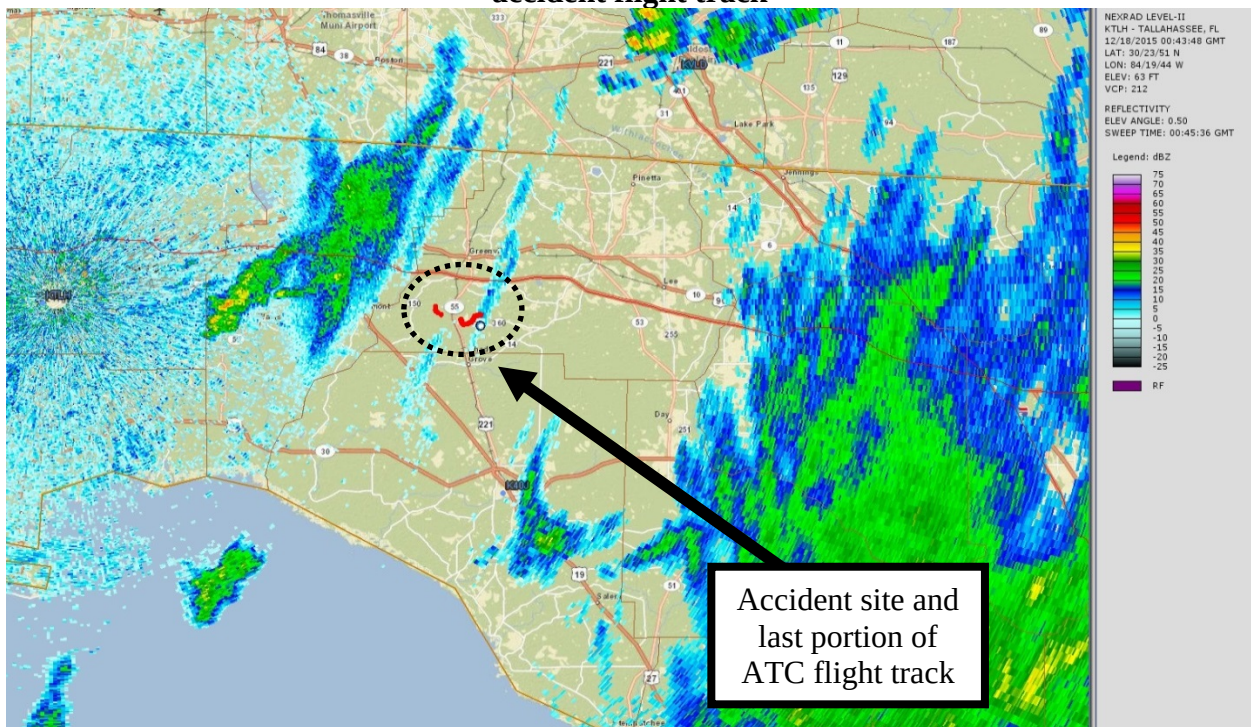


Figure 17 – KTLH WSR-88D reflectivity for the 0.5° elevation scan initiated at 1946 EST with accident flight track

7.0 Pilot Reports

All pilot reports (PIREPs) were reviewed close to the accident site from around three hours prior to the accident time to around three hours after the accident time and there were no PIREPs near the accident site valid below 15,000 feet.

The NTSB meteorologist reviewed the ATC recordings and interactions before, during, and after the accident flight. The ATC recordings revealed that Tallahassee ATC did solicit “weather” from the accident flight around 1835 EST and the accident flight provided weather information. The weather information provided by the accident flight at 1835 EST did not make it as a PIREP into the national airspace. Outside of this exchange of “weather” at 1835 EST, Tallahassee ATC did not solicit nor provide any PIREPs to the accident flight or any flights within the 2 hour period before the accident time nor within 5 minutes after the accident time in accordance with the FAA JO 7110 order.²¹

8.0 SIGMET and CWSU Advisories

No SIGMETs were valid for the accident site at the accident time.

No Center Weather Service Unit (CWSU) Advisory (CWA) was valid for the accident site at the accident time.

No Meteorological Impact Statement (MIS) was valid for the accident site at the accident time.

9.0 AIRMETs

AIRMET Sierra issued at 1545 EST and valid at the accident time, was the only AIRMET valid for the accident site at the accident time at the accident flight level (figure 18). AIRMET Sierra forecasted IFR conditions with ceiling below 1,000 feet agl and visibility below 3 miles in precipitation and mist:

WAUS42 KKCI 172045

WA2Z

_MIAZ WA 172045

AIRMET ZULU UPDT 3 FOR ICE AND FRZLVL VALID UNTIL 180300

.

AIRMET ICE...NC SC GA FL AND CSTL WTRS

FROM 160SE SIE TO 200ESE ECG TO 70SE ILM TO 70SW TLH TO 70SSW CEW

TO CEW TO 50SW PZD TO 30SSE LGC TO 20WSW CLT TO 20NNE GSO TO

30ENE ECG TO 160SE SIE

MOD ICE BTN 120 AND FL250. CONDS CONTG BYD 03Z THRU 09Z.

.

FRZLVL...RANGING FROM 080-175 ACRS AREA

120 ALG 40NW PZD-40SSE ATL-40SSW FLO-60SW ECG-20SSW ORF

160 ALG 90WSW SRQ-60S RSW-50ESE MIA-100ESE MIA

....

WAUS42 KKCI 172045

²¹ For more information see the ATC data contained in the docket of this accident.

WA2S

_MIAS WA 172045

AIRMET SIERRA UPDT 3 FOR IFR AND MTN OBSCN VALID UNTIL 180300

.

AIRMET IFR...NC SC GA FL AND CSTL WTRS

**FROM HMY TO 30ENE ECG TO 60SSE ECG TO 90S ECG TO 20SSW CHS TO
CRG TO 40S CTY TO 70SSW TLH TO 60SE SJI TO 40W CEW TO 50SW PZD
TO GQO TO HMY**

CIG BLW 010/VIS BLW 3SM PCPN/BR. CONDS CONTG BYD 03Z THRU 09Z.

.

AIRMET MTN OBSCN...NC SC GA

FROM 40SSE PSK TO CLT TO ATL TO GQO TO HMY TO 40SSE PSK

MTNS OBSC BY CLDS/PCPN/BR. CONDS CONTG BYD 03Z THRU 09Z.

.

OTLK VALID 0300-0900Z...IFR NC SC GA FL AND CSTL WTRS

BOUNDED BY HMY-30ENE ECG-60SSE ECG-20SSW CHS-CRG-30N TRV-20SSW
RSW-40SW SRQ-70S TLH-80SW TLH-50SW IRQ-GQO-HMY

CIG BLW 010/VIS BLW 3SM PCPN/BR. CONDS CONTG THRU 09Z.

....

WAUS42 KKCI 172045

WA2T

_MIAT WA 172045

AIRMET TANGO UPDT 3 FOR TURB AND STG SFC WNDZ VALID UNTIL 180300

.

AIRMET TURB...NC SC GA FL AND CSTL WTRS

FROM 160SE SIE TO 170ESE ECG TO 70SE ILM TO CRG TO CTY TO 50SW
PZD TO GQO TO HMY TO 20NE ECG TO 160SE SIE

MOD TURB BLW 150. CONDS CONTG BYD 03Z ENDG 03-06Z.

.

AIRMET STG SFC WNDZ...NC MA RI NY NJ MD DE VA CSTL WTRS

FROM 150ESE ACK TO 200SE ACK TO 160SE SIE TO 190ESE ECG TO
100ESE ECG TO 90E ORF TO 120SSE HTO TO 150ESE ACK

SUSTAINED SURFACE WINDS GTR THAN 30KT EXP. CONDS DVLPG 00-03Z.

CONDS CONTG BYD 03Z THRU 09Z.

.

OTLK VALID 0300-0900Z...TURB NC SC GA FL AND CSTL WTRS

BOUNDED BY HMY-30ENE ECG-160SE ECG-130SE ILM-130SSE ILM-170W PIE-
130ESE LEV-30ENE SJI-50SW PZD-GQO-HMY

MOD TURB BTN FL180 AND FL380. CONDS DVLPG 03-06Z. CONDS CONTG
THRU 09Z.

....

....

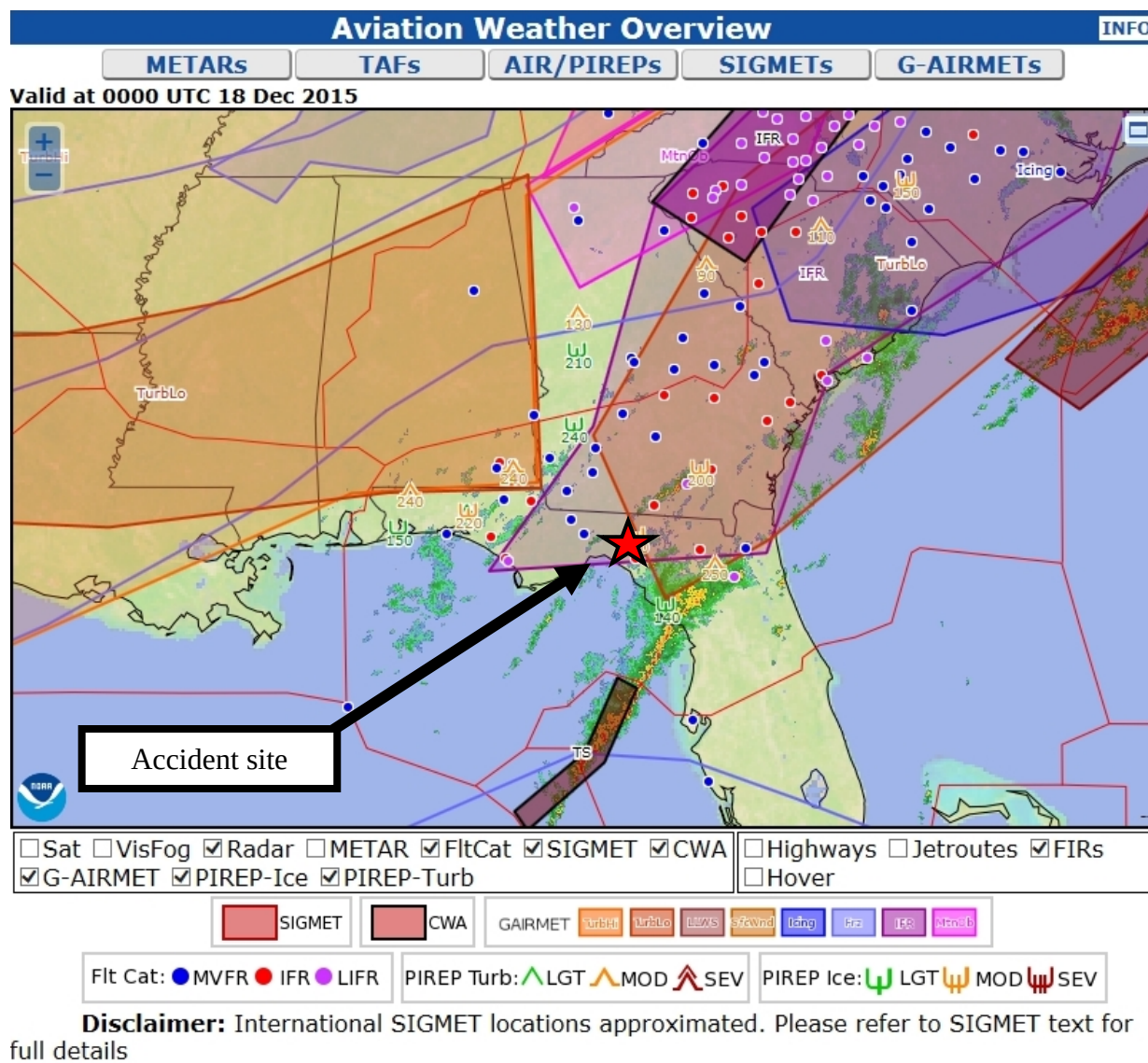


Figure 18 – AIRMETs and CWAs valid for the accident area at 1900 EST

The AIRMETs and CWAs valid for the southeastern United States and the accident site at 2000 EST, 1700 EST, and 1800 EST are provided in figures 19, 20, and 21. The Sierra AIRMETs all mentioned the IFR conditions across most of the eastern portion of the southeast United States and southward into northern Florida.

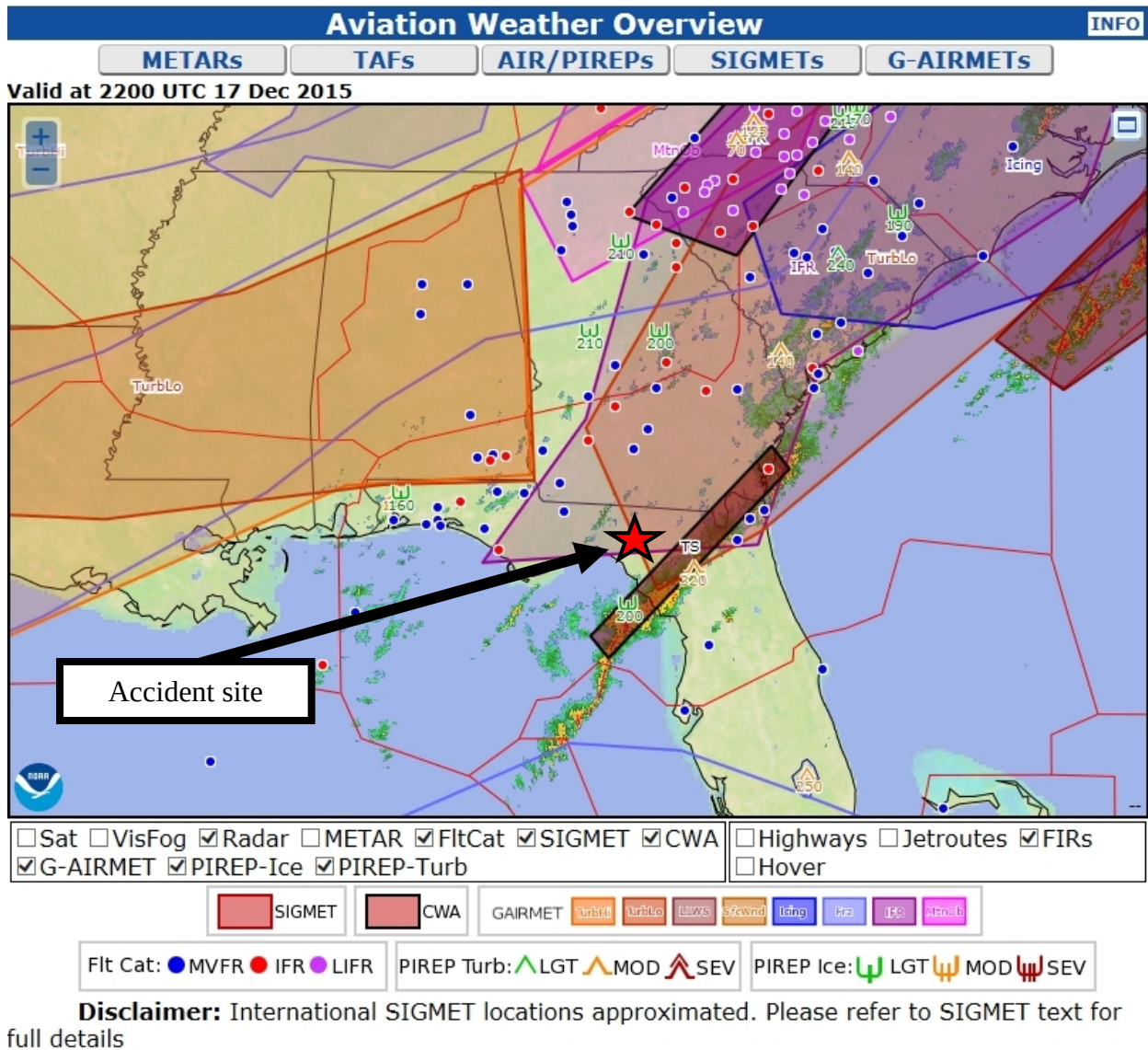
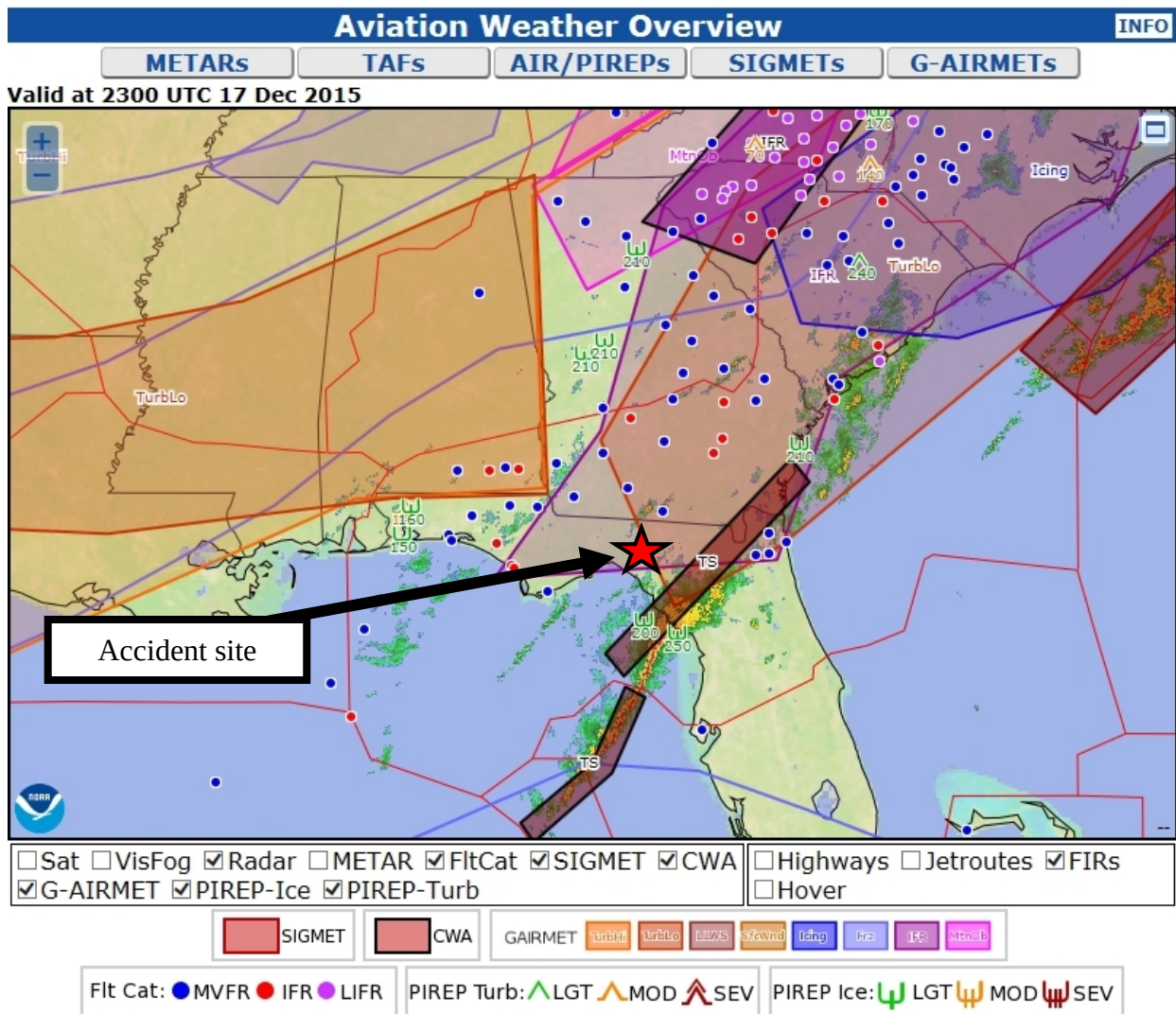


Figure 20 – AIRMETs and CWAs valid for the accident area at 1700 EST



Disclaimer: International SIGMET locations approximated. Please refer to SIGMET text for full details

Figure 21 – AIRMETs and CWAs valid for the accident area at 1800 EST

10.0 Area Forecast

The Area Forecast issued at 1345 EST valid at the accident time forecasted an overcast ceiling at 1,500 feet msl with tops at 10,000 feet msl, scattered light rain showers, widely scattered thunderstorms with cumulonimbus tops to FL400²². At 2000 EST the Area Forecast forecasted conditions to worsen with an overcast ceiling at 1,000 feet msl:

FAUS42 KKKI 171845
FA2W

²² Flight Level – A Flight Level (FL) is a standard nominal altitude of an aircraft, in hundreds of feet. This altitude is calculated from the International standard pressure datum of 1013.25 hPa (29.92 inHg), the average 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.

_MIAC FA 171845

SYNOPSIS AND VFR CLDS/WX

SYNOPSIS VALID UNTIL 181300

CLDS/WX VALID UNTIL 180700...OTLK VALID 180700-181300

NC SC GA FL AND CSTL WTRS E OF 85W

.
SEE AIRMET SIERRA FOR IFR CONDS AND MTN OBSCN.

TS IMPLY SEV OR GTR TURB SEV ICE LLWS AND IFR CONDS.

NON MSL HGTS DENOTED BY AGL OR CIG.

.
SYNOPSIS...19Z CDFNT ALG A 20E PSK-SPA-30E CEW-140S CEW LN. 13Z

CDFNT ALG AN 80E ORF-120SE ECG-ORL-110SW SRQ LN.

.
NC

MTNS...OVC030 TOPS 090. SCT -SHRA. 22Z BKN030. BECMG 0305 BKN030
BKN070. OCNL VIS 3SM BR. OTLK...IFR CIG BR THRUT EXC TIL 10Z VFR
SWRN SXNS.

PIEDMONT...OVC015 LYRD FL300. VIS 3-5SM -RA BR. BECMG 0003 OVC015
LYRD FL200. VIS 3SM BR. OCNL -DZ. OTLK...IFR CIG BR.

CSTL PLAINS...OVC015 LYRD FL300. VIS 3-5SM IN SCT -SHRA BR. ISOL
-TSRA. CB TOPS FL400. OTLK...IFR CIG SHRA BR THRUT EXC MVFR CIG
SHRA SRN CSTLN.

.
SC

NW THIRD...OVC020 LYRD FL200. OCNL VIS 3-5SM BR. TIL 22Z WDLY SCT
-SHRA. OTLK...IFR CIG 11Z VFR.

CNTRL THIRD...BKN020 LYRD FL200. SCT -SHRA. OTLK...MVFR CIG SHRA
10Z VFR.

SE THIRD...SCT015 BKN040 LYRD FL180. SCT -SHRA. WDLY SCT -TSRA.

CB TOPS FL400. 02Z BKN015-025. SCT -SHRA. WDLY SCT -TSRA.

OTLK...MVFR CIG SHRA.

.
GA

NRN-W CNTRL...OVC020 TOPS 070. TIL 23Z WDLY SCT -SHRA ERN SXNS.
OTLK...MVFR CIG 12Z VFR.

SRN-E CNTRL...BKN015 BKN045 BKN150 TOPS FL250. SCT -SHRA. WDLY
SCT -TSRA. CB TOPS FL400. OTLK...IFR CIG SHRA BR THRUT EXC VFR
WRN SXNS.

.
FL

PNHDL...

W THIRD...BKN010 LYRD 150. BECMG 0003 SCT150. OTLK...VFR.

CNTRL THIRD...BKN015 OVC070 TOPS 150. 05Z SCT030 BKN CI.

OTLK...VFR.

**E THIRD...OVC015 TOPS 100. SCT -SHRA. WDLY SCT -TSRA. CB TOPS
FL400. 01Z OVC010. WDLY SCT -SHRA. OTLK...IFR CIG 10Z VFR.**

NRN PEN...BKN030 TOPS 100 BKN CI. WDLY SCT -SHRA/-TSRA. CB TOPS
FL400. BECMG 0305 OVC025. SCT -SHRA. WDLY SCT -TSRA. OTLK...IFR
CIG SHRA BR.

CNTRL PEN...SCT015-025 SCT-BKN CI. BECMG 0003 SCT025 SCT-BKN100
TOPS 150. WDLY SCT -SHRA. OTLK...MVFR CIG SHRA BR.

SRN PEN...SCT025-035 SCT-BKN CI. OTLK...MVFR CIG WRN SXNS...VFR
ERN SXNS.

.
CSTL WTRS

ATLC WTRS...

NC...BKN020 BKN040 TOPS 080. SCT -SHRA. WDLY SCT -TSRA. CB
 TOPS FL400. BECMG 0003 BKN015-025 LYRD FL200. SCT -SHRA.
 WDLY SCT -TSRA. OTLK...MVFR CIG TSRA.
 SC/GA/NERN FL...SCT020 SCT-BKN040 TOPS 060. BECMG 2201 SCT015
 SCT-BKN035 TOPS 080. WDLY SCT -SHRA/-TSRA. CB TOPS FL400.
 OTLK...MVFR CIG TSRA.
 SE FL...SCT020-030. BECMG 0306 SCT020 SCT-BKN040 TOPS 080.
 WDLY SCT -SHRA. OTLK...VFR TSRA.
 GULF WTRS E OF 85W...
 N OF SRQ...SCT020 SCT-BKN040 TOPS 100. WDLY SCT -SHRA. BECMG
 2302 BKN015-025 TOPS 170. SCT -SHRA. WDLY SCT -TSRA. CB TOPS
 FL400. OTLK...MVFR CIG SHRA.
 SRQ SWD...SCT020 SCT-BKN CI. BECMG 0205 SCT020 SCT-BKN040 TOPS
 080. WDLY SCT -SHRA. OTLK...MVFR CIG TSRA.

11.0 Terminal Aerodrome Forecast

KVLD was the closest site with a NWS TAF. The TAF valid at the time of the accident was issued at 1820 EST and was valid for a 24-hour period beginning at 1900 EST. The TAF for KVLD was as follows:

TAF KVLD 172320Z 1800/1824 **23004KT 5SM SHRA BKN015**
 FM180400 25004KT 4SM BR OVC007
 FM181300 33008KT P6SM SCT015 BKN250
 FM181500 34007KT P6SM FEW250=

The forecast expected a wind from 230° at 4 knots, 5 miles visibility, rain showers, and a broken ceiling at 1,500 feet agl at the time of the accident.

12.0 National Weather Service Area Forecast Discussion

The National Weather Service Office in Tallahassee, Florida, issued an Area Forecast Discussion (AFD) at 1834 EST. The aviation section of the AFD mentioned heavier precipitation had ended in most locations across the area, except for KVLD, but light rain showers were expected across the area through the evening. IFR to MVFR²³ ceilings were expected to persist overnight with ceiling conditions improving by the following morning:

FXUS62 KTAE 172334
 AFDTAE
 AREA FORECAST DISCUSSION
 NATIONAL WEATHER SERVICE TALLAHASSEE FL
 634 PM EST THU DEC 17 2015
.Aviation...
[Through 00Z Saturday]...
The heavier precipitation has diminished, except around VLD, but
overall the trend should be for light showers through the evening.
IFR to MVFR cigs are around this evening but conditions will
improve by tomorrow morning as the front moves through tonight.

²³ Marginal Visual Flight Rules – Refers to the general weather conditions pilots can expect at the surface. MVFR criteria means a ceiling between 1,000 and 3,000 feet agl and/or 3 to 5 miles visibility.

&&

.Prev Discussion [440 PM EST]...

.Near Term [Through Tonight]...

As of 19Z, the cold front had reached close to a Macon, to Blakely, to Destin line, and was continuing to push steadily east. The coverage of rain and embedded convection has diminished over the past several hours ahead of the front. However, there remains a signal in some models that some light-moderate rain may redevelop later this afternoon or evening before the front fully exits the area. Therefore, we maintained at least "chance" (30% or higher) PoPs through the afternoon over most of the area, gradually ending things from west to east overnight. Outside of rain showers, some patchy drizzle can't be ruled out prior to the frontal passage either. The threat of any severe storms appears to be greatly diminished at this point with instability decreasing and shear profiles becoming increasingly unidirectional. Temperatures should stay fairly mild prior to 06Z, with a sharper drop thereafter as the cloud cover associated with the front begins to depart and northwesterly winds begin to increase. The low temperatures may actually "overshoot" the typical time of lows around 11Z or so, with additional cooling possible through around 13Z (8 AM EST, or an hour or two after sunrise).

.Short Term [Friday Through Saturday Night]...

By Friday morning, the cold front will be mostly through the region. A few showers are possible in the eastern Big Bend Friday morning. By Friday afternoon, showers and clouds will be out of the region. Northerly flow will bring cold, dry air into the region as high pressure moves in. Despite sunny skies, highs on Saturday will be in the upper 50s in the northern and western regions and in the 60s elsewhere. Temperatures will plummet after sunset as cold air advection continues. Lows on Friday night will be in the lower 30s.

On Saturday, cold, dry air will remain in place. Expect sunny skies with POPs near zero. Highs Saturday will be much cooler in the upper 50s and lower 60s. Saturday night will be cold with lows in the lower to mid 30s.

.Long Term [Sunday Through Thursday]...

Cool, dry air will remain in place on Sunday as high pressure dominates the region. Sunday will be mostly sunny with POPs near zero. Highs will be in the 60s. On Monday, winds will become southerly and warm, moist air will begin to move into the region once again. A low near the Great Lakes will be dragging a cold front across the south. This front will weaken and stall out before it reaches this area. As a result, rain chances will increase beginning Monday night and will stay elevated through at least Thursday. Tuesday, Wednesday and Thursday will be gloomy with rain off and on. Highs will be mainly in the 70s for the workweek. Lows next week will be mild in the 50s and 60s.

.Marine...

Light to moderate southerly winds will shift after a cold front moves through. Northwesterly winds will increase to around 20 knots late tonight in the western zones and early Friday morning in the eastern zones. A Small Craft Advisory (winds over 20 knots) will be in effect until at least Saturday afternoon. Winds will stay elevated around 10 to 20 knots for the rest of the week.

.Fire Weather...

A cold front will move through tonight with drier air pushing in for Friday and Saturday. RH values will drop into the 30s on Friday and into the 20s on Saturday. While it appears at this point, RH values will be at or above 25 percent in Georgia and Alabama on Saturday, they will reach into the lower to mid 20s across the Big Bend area of Florida. Wind criteria for a Red Flag Warning is not forecast to be met but will need to monitor the ERC values as Saturday approaches.

.Hydrology...

Except for a few showers, the rain is coming to an end for most of the region. The only exception is the Big Bend Region where rain is still forming ahead of the cold front. This rainfall is not expected to impact local rivers and creeks significantly.

The large scale pattern is forecast such that the system next week bears watching for some heavier rainfall potential, but since it is still several days away there is plenty of time to keep an eye on that.

&&

.Preliminary Point Temps/PoPs...

Tallahassee	52	61	33	60	35	/	70	10	0	0	0
Panama City	49	59	37	59	41	/	30	0	0	0	0
Dothan	43	58	32	56	35	/	10	0	0	0	0
Albany	46	59	31	57	33	/	30	10	0	0	0
Valdosta	54	62	33	58	36	/	60	10	0	0	0
Cross City	61	67	34	63	37	/	70	20	0	0	0
Apalachicola	53	63	38	61	42	/	60	10	0	0	0

&&

.TAE WATCHES/WARNINGS/ADVISORIES...

FL...NONE.

GA...NONE.

AL...NONE.

GM...Small Craft Advisory from 1 AM Friday to 1 PM EST Saturday FOR

Coastal waters from Apalachicola to Destin FL out 20 NM-

Waters from Apalachicola to Destin FL from 20 to 60 NM.

Small Craft Advisory from 4 AM Friday to 1 PM EST Saturday FOR

Waters from Suwannee River to Apalachicola FL from 20 to 60

NM.

&&

\$\$

13.0 Pilot Weather Briefing

A search of official weather briefing sources, such as Lockheed Martin Flight Service (LMFS) and Direct User Access Terminal Service (DUATS), revealed that the accident pilot received weather briefing information at 1425 to 1431 EST from LMFS Flight Watch. This briefing was received while the accident aircraft was located on its inbound flight over South Alabama Regional Airport located in south Alabama enroute to Orlando Apopka Airport (X04). The accident pilot requested updated weather information on the weather in Tallahassee on the 1425 to 1431 EST LMFS Flight Watch weather briefing. The weather briefer provided the current AIRMETs for turbulence, icing, and IFR conditions all valid at the accident aircraft's current location in south Alabama at 1425 to 1431 EST. The weather briefer indicated that "VFR flight not recommended with IMC at the surface," then provided the current METAR for KTLH and the TAF for KTLH, which forecasted an overcast ceiling at 1,500 feet agl and moderate rain showers till 2000 EST. The current CWA issued by Jacksonville Center CWSU was provided by the weather briefer and the CWA discussed a line of rain and embedded thunderstorms moving from 230° at 40 knots with thunderstorms tops to FL350 east of Tallahassee and moving northeastward across northern Florida in between the accident aircraft and X04. The accident aircraft mentioned they intended to remain VFR throughout the flight. The weather briefer said "VFR flight not recommended" and provided an alternate destination airport.

The accident flight took off from X04 around 1800 EST. The accident pilot did not contact LMFS or DUATS to receive a weather briefing prior to departure from X04. There is no knowledge of any additional weather briefing information the accident pilot received. For more information please see attachment 1.

14.0 Witness Information

A former FAA inspector, accident investigator, and FAA Flight Service Station Pilot Weather Briefer was located at X04 before the accident flight landed at X04 around 1700 EST. The former investigator mentioned that the passenger for the accident flight had been watching the accident aircraft while enroute to X04 and that on the inbound flight the passenger had seen the accident aircraft fly along a line of weather in Mississippi before finally getting through the weather near Atlanta, Georgia, and heading southward to X04. While the accident aircraft was being refueled the former FAA investigator talked to the accident pilot, and the former FAA investigator mentioned that the weather was really bad along a line from just west of Tallahassee to the northeast to which the accident pilot agreed. The former FAA investigator left the airport while the accident flight was refueling and the accident pilot looked to be in a hurry. For more information please see attachment 2.

15.0 Astronomical Data

The astronomical data obtained from the United States Naval Observatory for the accident site on December 17, 2015, indicated the following:

SUN

Begin civil twilight	0658 EST
Sunrise	0725 EST
Sun transit	1231 EST
Sunset	1736 EST
End civil twilight	1803 EST

MOON

Moonrise	1201 EST
Moon transit	1800 EST
Moonset	0004 EST on the following day

It was completely dark when the accident occurred with the phase of the Moon as a waxing crescent with 40% of the Moon's visible disk illuminated. With the abundant cloud cover surrounding the accident site at the accident time, it was unlikely the Moon provided any illumination for the accident flight.

F. LIST OF ATTACHMENTS

Attachment 1 – LMFS weather briefing between 1425 and 1431 EST

Attachment 2 – Witness statement

Paul Suffern
NTSB, AS-30