



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

July 23, 2021

Specialist's Factual Report

METEOROLOGY

ERA21LA141

Table Of Contents

A.	ACCIDENT	3
B.	METEOROLOGIST	3
C.	DETAILS OF THE INVESTIGATION	3
D.	FACTUAL INFORMATION	4
1.0	Synoptic Situation	4
1.1	Surface Analysis Chart	4
2.0	Surface Observations	5
3.0	Upper Air Sounding	9
4.0	Satellite Data	11
5.0	Regional Radar Imagery Information	12
6.0	Radar Imagery Information	13
6.1	Volume Scan Strategy	13
6.2	Beam Height Calculation	15
6.3	Reflectivity	15
6.4	Base Reflectivity and Lightning Data	16
7.0	Pilot Reports	18
8.0	Significant Meteorological Information	19
9.0	Center Weather Service Advisories	19
10.0	Airmen's Meteorological Information	19
11.0	Terminal Aerodrome Forecast	19
12.0	Winds and Temperature Aloft Forecast	19
13.0	Astronomical Data	20
E.	LIST OF ATTACHMENTS	20

A. ACCIDENT

Location: about 16 miles southeast of Boca Raton, Florida
Date: February 24, 2021
Time: 1104 eastern standard time
1604 Coordinated Universal Time (UTC)
Airplane: Lancair 320; Registration: N670BS

B. METEOROLOGIST

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

C. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's (NTSB) Meteorologist did not travel for this investigation and gathered the weather data for this investigation from official National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) sources and also from the National Centers for Environmental Information (NCEI). This specialist factual contains the meteorological factors pertinent to the weather surrounding the accident time. All times are eastern standard time (EST) and are based upon the 24-hour clock, where local time is -5 hours from UTC. 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. 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 last air traffic control (ATC) track point was located at latitude 26.19765° N, and longitude 79.8889° W.

D. FACTUAL INFORMATION

1.0 Synoptic Situation

The synoptic or large-scale migratory weather systems influencing the area were documented using standard NWS charts issued by the National Center for Environmental Prediction and the Weather Prediction Center, located in College Park, Maryland. These are the base products used in describing synoptic weather features and in the creation of forecasts and warnings for the NWS. Reference to these charts can be found in the joint NWS and Federal Aviation Administration (FAA) Advisory Circular “Aviation Weather Services”, AC 00-45H.¹

1.1 Surface Analysis Chart

The NWS Surface Analysis Chart centered over Florida for 1000 EST is provided as figure 1 with the location of the accident site within the red circle. The chart depicted a stationary frontal boundary oriented from east to west immediately south of the accident site stretching from the Bahamas westward into the southeastern Gulf of Mexico. A high-pressure center with a pressure of 1024-hectopascals (hPa) was located in the northeastern Gulf of Mexico.

The station models around the accident site depicted air temperatures in the 70’s degrees Fahrenheit (°F), dew point temperatures in the mid 60’s °F with temperature-dew point spreads of 10°F or less, a southeast to northeast wind at 15 knots, mostly cloudy skies, and light rain reported along the eastern Florida coast near the accident site.

¹

https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1030235

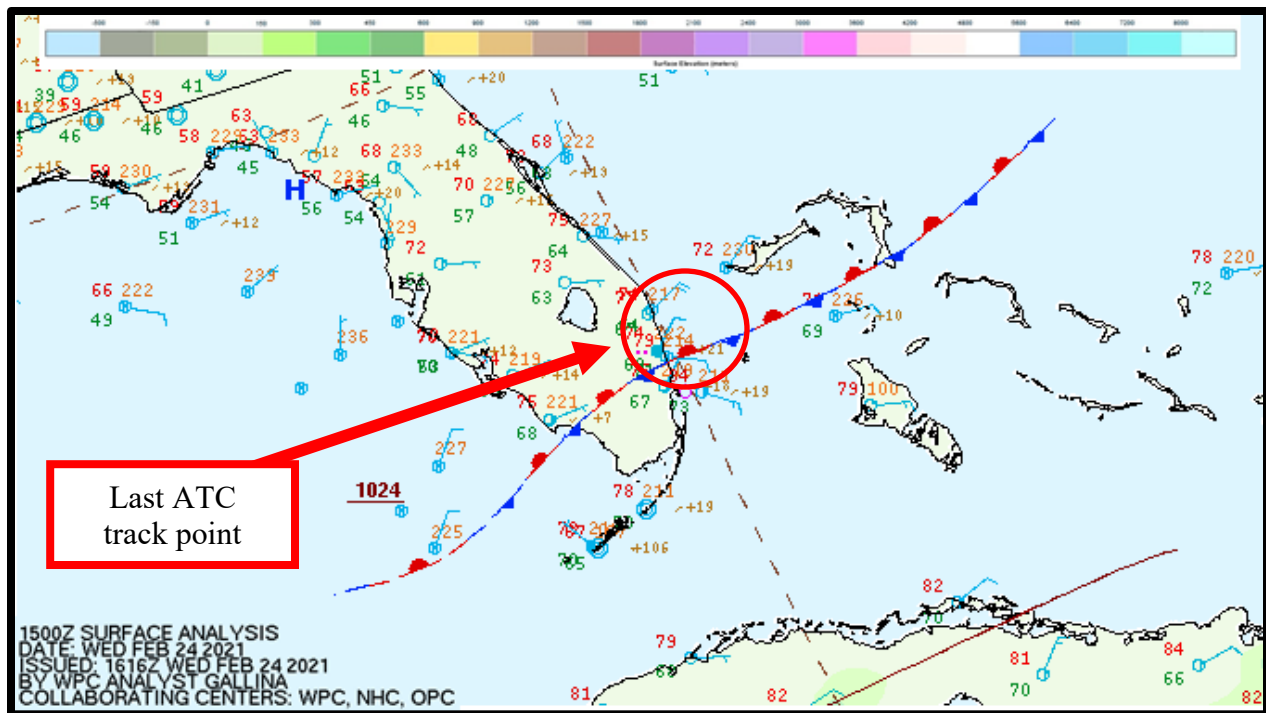


Figure 1 – NWS Surface Analysis Chart for 1000 EST.

2.0 Surface Observations

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

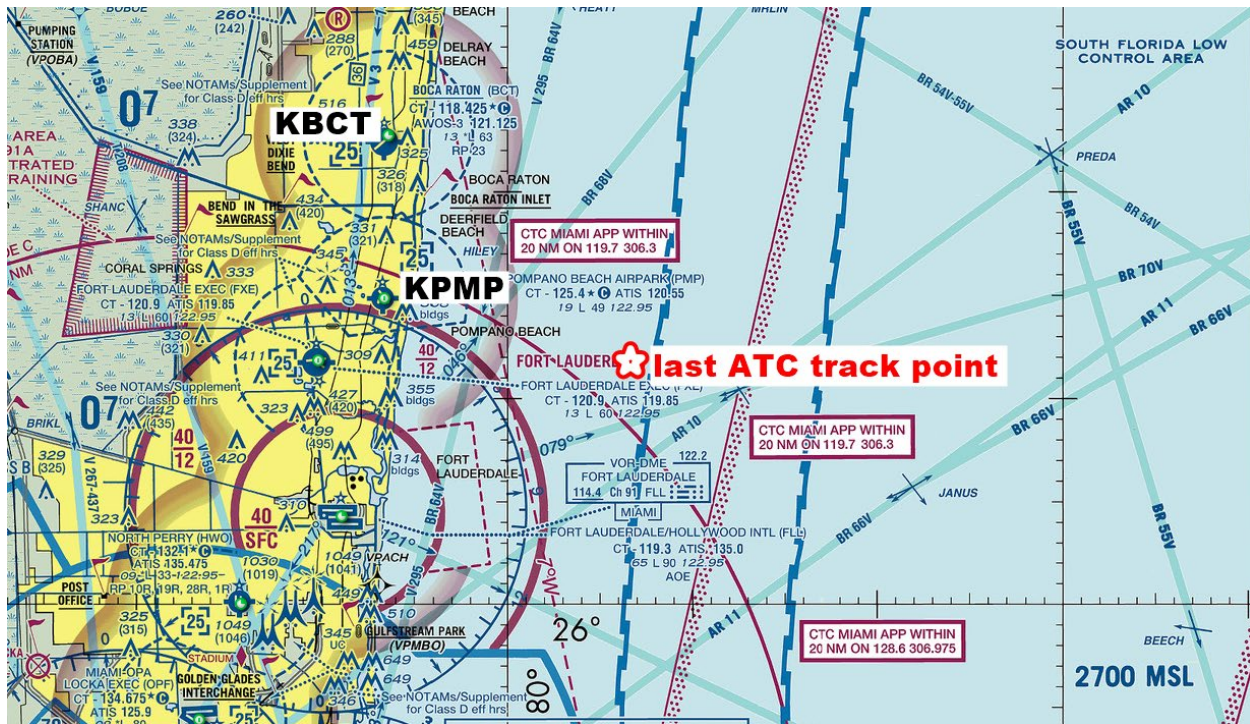


Figure 2 – Sectional map of the accident area with the location of the accident site and surface observation sites.

Pompano Beach Airpark (KPMP) had the closest official weather station to the accident site. KPMP had an Automated Surface Observing System (ASOS²) whose longline³ reports were augmented by ATC personnel when the tower was in operation⁴. KPMP ASOS was located 12 miles west-northwest of the accident site, at an elevation of 19 feet (ft), and had a 7° westerly magnetic variation⁵ (figure 2). The following longline observations were disseminated during the times surrounding the accident:⁶

² ASOS – Automated Surface Observing System is equipped with meteorological instruments to observe and report wind, visibility, weather phenomena, ceiling, temperature, dewpoint, altimeter, and barometric pressure.

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

⁴ ATC hours were between 0700 and 2100 local.

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

⁶ The bold sections in this NWS product and the rest of the products in this report are intended to highlight the text that directly reference the weather conditions that affected the accident location around the accident time. The local times in this section next to the METARs are provided for quick reference between UTC and local times around the accident time.

[1025 EST] SPECI KPMP 241525Z VRB04KT 3/4SM +RA BR SCT019 BKN026 OVC035
22/22 A3019 RMK AO2 P0076 T02170217 \$=

[1031 EST] SPECI KPMP 241531Z VRB04KT 1SM +RA BR FEW009 BKN019 OVC041
22/22 A3019 RMK AO2 P0083 T02170217 \$=

[1044 EST] SPECI KPMP 241544Z 08016G19KT 3/4SM +RA BR FEW012 BKN028
OVC037 22/22 A3018 RMK AO2 P0112 T02170217 \$=

[1053 EST] METAR KPMP 241553Z 04010KT 1/2SM +RA FG BKN016 BKN023 OVC042
22/21 A3019 RMK AO2 SLP223 P0144 T02170211 \$=

***[1057 EST] SPECI KPMP 241557Z 04008KT 1SM +RA BR BKN019 BKN034 OVC043
22/21 A3018 RMK AO2 P0005 T02170211 \$=***

ACCIDENT TIME 1104 EST

***[1121 EST] SPECI KPMP 241621Z 07008KT 2SM RA BR SCT024 BKN036 OVC070 22/22
A3018 RMK AO2 P0033 T02170217 \$=***

[1153 EST] METAR KPMP 241653Z 09008KT 4SM -RA BR FEW010 FEW031 OVC075
22/22 A3017 RMK AO2 SLP217 P0036 T02220217=

KPMP weather at 1057 EST, wind from 040° at 8 knots, visibility 1 mile, heavy rain, mist, broken ceiling at 1,900 ft above ground level (agl), broken skies at 3,400 ft agl, overcast skies at 4,300 ft agl, temperature of 22°Celsius (C), dew point temperature of 21°C, and an altimeter setting of 30.18 inches of mercury (inHg). Remarks: automated station with a precipitation discriminator, 0.05 inches of precipitation since 1053 EST, temperature 21.7°C, dew point temperature 21.1°C, maintenance is needed on the system.

KPMP weather at 1121 EST, wind from 070° at 8 knots, visibility 2 miles, moderate rain, mist, scattered clouds at 2,400 ft agl, broken ceiling at 3,600 ft agl, overcast skies at 7,000 ft agl, temperature of 22°C, dew point temperature of 22°C, and an altimeter setting of 30.18 inHg. Remarks: automated station with a precipitation discriminator, 0.33 inches of precipitation since 1053 EST, temperature 21.7°C, dew point temperature 21.7°C, maintenance is needed on the system.

Boca Raton Airport (KBCT) was the intended destination airport. KBCT had an Automated Weather Observing System (AWOS⁷) whose longline reports were augmented by ATC when tower in operation⁸. KBCT AWOS was located 16 miles northwest of the accident site, at an elevation of 13 ft (figure 2). The following automated longline observations were disseminated during the times surrounding the accident:

⁷ AWOS – Automated Weather Observing System is equipped with meteorological instruments to observe and report temperature, dewpoint, wind speed and direction, visibility, cloud coverage and ceiling up to 12,000 feet, and altimeter setting. AWOS are maintained by the FAA.

⁸ ATC hours were between 0700 and 2300 local.

[0647 EST] METAR KBCT 241147Z 09007KT 10SM SCT020 BKN032 23/19 A3013=

[0747 EST] METAR KBCT 241247Z 10010KT 10SM BKN020 24/20 A3015=

[0847 EST] METAR KBCT 241347Z 10010KT 10SM BKN021 24/20 A3017=

[0947 EST] METAR KBCT 241447Z 09010KT 10SM BKN021 23/21 A3019=

[1047 EST] METAR KBCT 241547Z 09010KT 10SM SCT020 24/20 A3019=

ACCIDENT TIME 1104 EST

[1147 EST] METAR KBCT 241647Z 11010KT 10SM SCT021 24/20 A3017=

[1247 EST] METAR KBCT 241747Z 12010KT 10SM SCT021 25/20 A3013=

KBCT weather at 1047 EST, wind from 090° at 10 knots, visibility 10 miles or greater, scattered clouds at 2,000 ft agl, temperature of 24°C, dew point temperature of 20°C, and an altimeter setting of 30.19 inHg.

KBCT weather at 1147 EST, wind from 110° at 10 knots, visibility 10 miles or greater, scattered clouds at 2,100 ft agl, temperature of 24°C, dew point temperature of 20°C, and an altimeter setting of 30.17 inHg.

The observations from KBCT surrounding the accident time indicated VFR⁹ conditions with an east wind at 10 knots. At KPMP IFR conditions were reported due to visibility restrictions in heavy rain and mist.

⁹ As defined by the NWS and the FAA Aeronautical Information Manual (AIM) section 7-1-7 defines the following general flight categories:

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

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

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

3.0 Upper Air Sounding

A High-Resolution Rapid Refresh (HRRR)¹⁰ model sounding was created for the accident site for 1100 EST which provided a surface elevation of sea level.¹¹ The 1500 EST HRRR sounding was plotted on a standard Skew-T Log P diagram¹² with the derived stability parameters included in figure 3 with data from the surface to 700-hPa (or approximately 10,000 ft msl). These data were analyzed using the RAOB¹³ software package. The sounding depicted the lifted condensation level (LCL)¹⁴ at 1,515 ft agl, the level of free convection (LFC)¹⁵ at 1,526 ft agl, and the convective condensation level (CCL)¹⁶ at 2,395 ft agl. The freezing level was located at 15,470 ft msl. The precipitable water value was 1.53 inches.

¹⁰ 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.

¹¹ HRRR sounding was created using NOAA Air Resource Laboratory: <https://ready.arl.noaa.gov/READYamet.php>

¹² 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.

¹³ RAOB – (The complete Rawinsonde Observation program) is an interactive sounding analysis program developed by Eosonde Research Services, The Villages, Florida.

¹⁴ LCL - The height at which a parcel of moist air becomes saturated when it is lifted dry adiabatically.

¹⁵ 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.

¹⁶ CCL – The level in the atmosphere to which an air parcel, if heated from below, will rise dry adiabatically, without becoming colder than its environment just before the parcel becomes saturated.

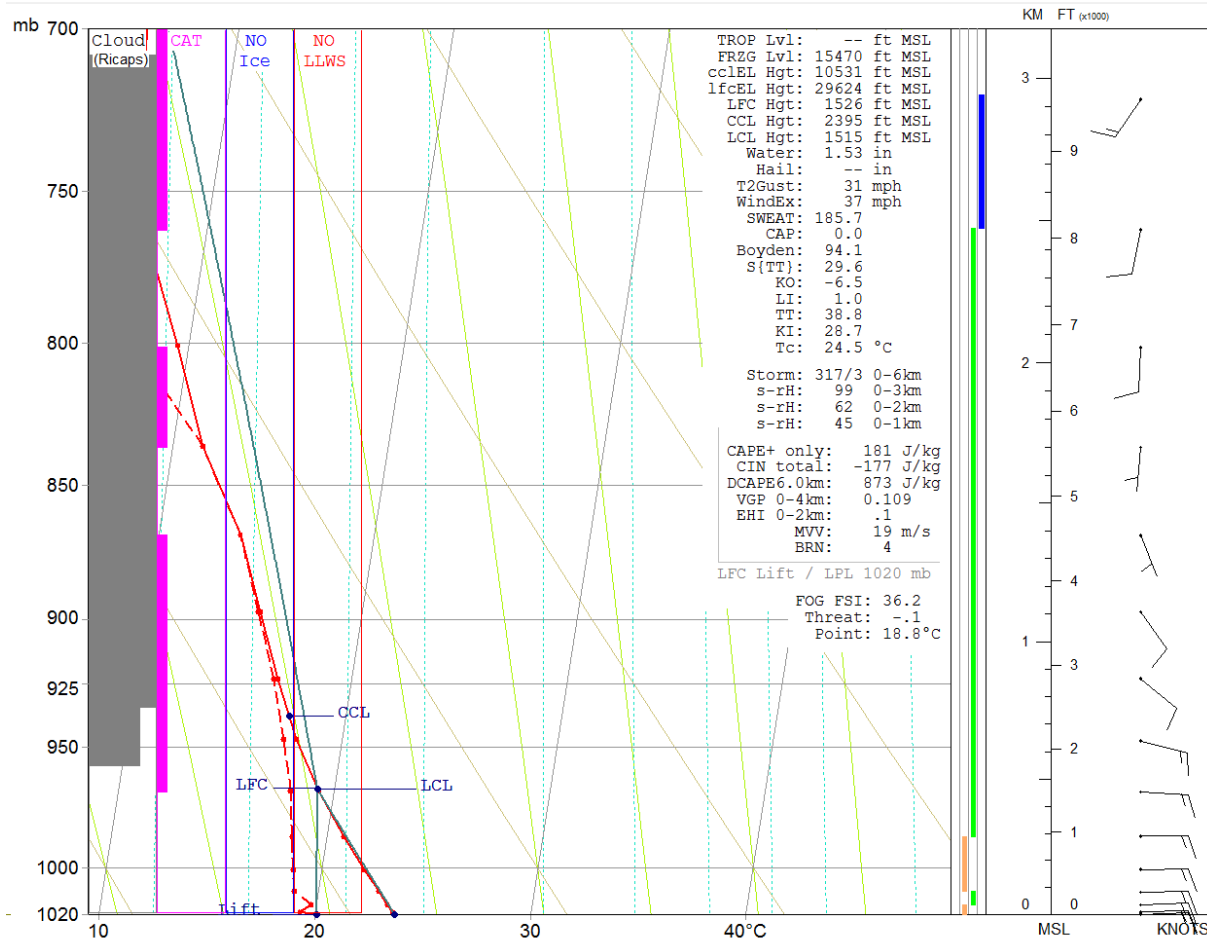


Figure 3 – 1100 EST HRRR sounding.

The 1100 EST HRRR sounding for the accident site indicated an unstable to conditionally unstable atmosphere with the Convective Available Potential Energy (CAPE)¹⁷ of 181 Joules/kilogram (J/kg), with the maximum vertical velocity (MVV) for this atmosphere was calculated as 19 meters/second (about 3,740 ft per minute).¹⁸ Given the environment, RAOB indicated the potential for thunderstorms and rain shower development was possible. Downdraft CAPE (DCAPE; 6 kilometers agl)¹⁹ was measured at 873 J/kg. If rain showers or thunderstorms formed in this environment, the 1100 EST HRRR sounding indicated that the strongest wind speeds possible at the surface (due to, for example, a microburst, outflow boundary, or gust front) would have been 37 mph (32 knots) according to the WindEx parameter. Outside of rain shower activity RAOB indicated cloud cover from 2,000 through 10,000 ft msl.

¹⁷ 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.

¹⁸ 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.

¹⁹ The DCAPE can be used to estimate the potential strength of rain-cooled downdrafts within thunderstorm convection, and is similar to CAPE. Larger DCAPE values are associated with stronger downdrafts.

The 1100 EST HRRR sounding wind profile indicated a near surface wind from 088° at 14 knots with the wind remaining from the east through 2,500 ft msl near 15 knots. No low-level wind shear (LLWS) was indicated by RAOB outside of rain shower or thunderstorm activity. RAOB indicated the possibility of light clear-air turbulence in several layers above 2,000 ft msl.

4.0 Satellite Data

The Geostationary Operational Environmental Satellite number 16 (GOES-16) visible and infrared data were obtained from an archive at the Space Science Engineering Center at the University of Wisconsin-Madison in Madison, Wisconsin, and processed using the Man-computer Interactive Data Access System software. Visible and infrared imagery (GOES-16 bands 2 and 13) at wavelengths of 0.64 microns (μm) and 10.3 μm , respectively, were retrieved for the period from 0900 EST through 1400 EST and reviewed, and the closest images to the time of the accident were documented.

Figure 4 presents the GOES-16 visible imagery from 1100 EST at 2X magnification with the accident site highlighted with a red square. There was cloud cover above the accident site at the accident time. Figure 5 presents the GOES-16 infrared imagery from 1100 EST at 6X magnification with the accident site highlighted with a red square. The lower brightness temperatures (red colors; higher cloud tops) were located west, south, and east of the accident site. Based on the brightness temperatures (about 281 Kelvin) above the accident site and the vertical temperature profile provided by the 1100 EST HRRR sounding, the approximate cloud-top heights over the accident site were 7,500 ft msl at 1100 EST. It should be noted these figures have not been corrected for any parallax error.

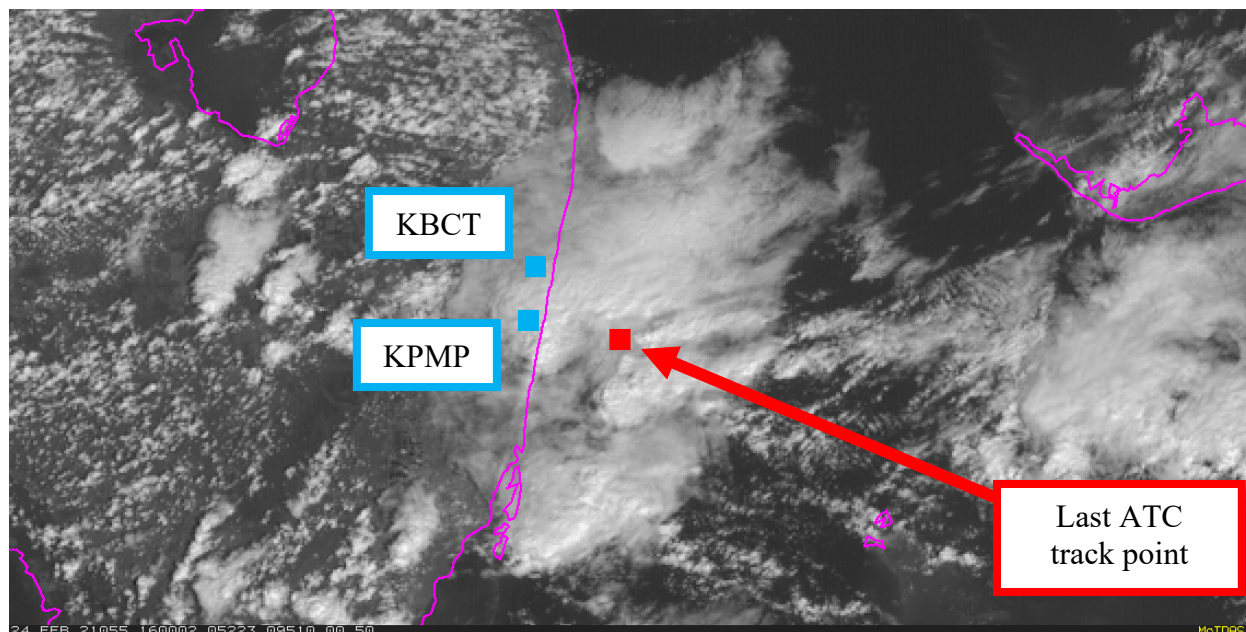


Figure 4 – GOES-16 visible image at 1100 EST.

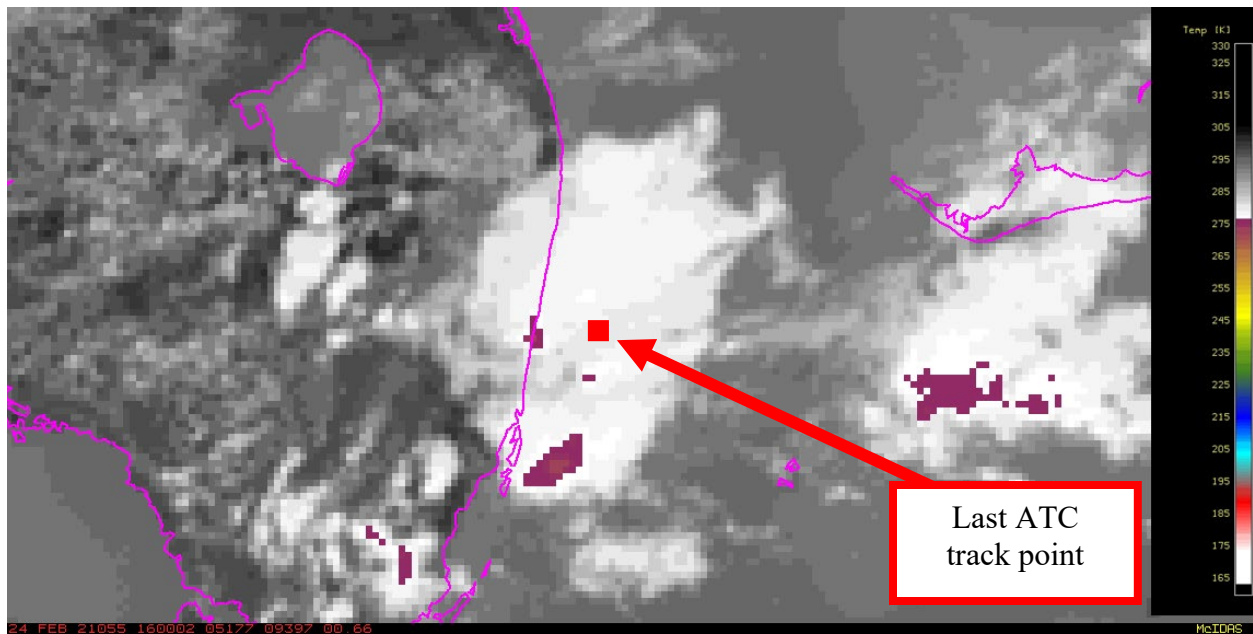


Figure 5 – GOES-16 infrared image at 1100 EST.

5.0 Regional Radar Imagery Information

A regional view of the NWS national composite radar mosaic is included as figure 6 for 1105 EST with the approximate location of the last ATC target point marked within a red circle. The image depicted no precipitation echoes above the target point at the accident time.

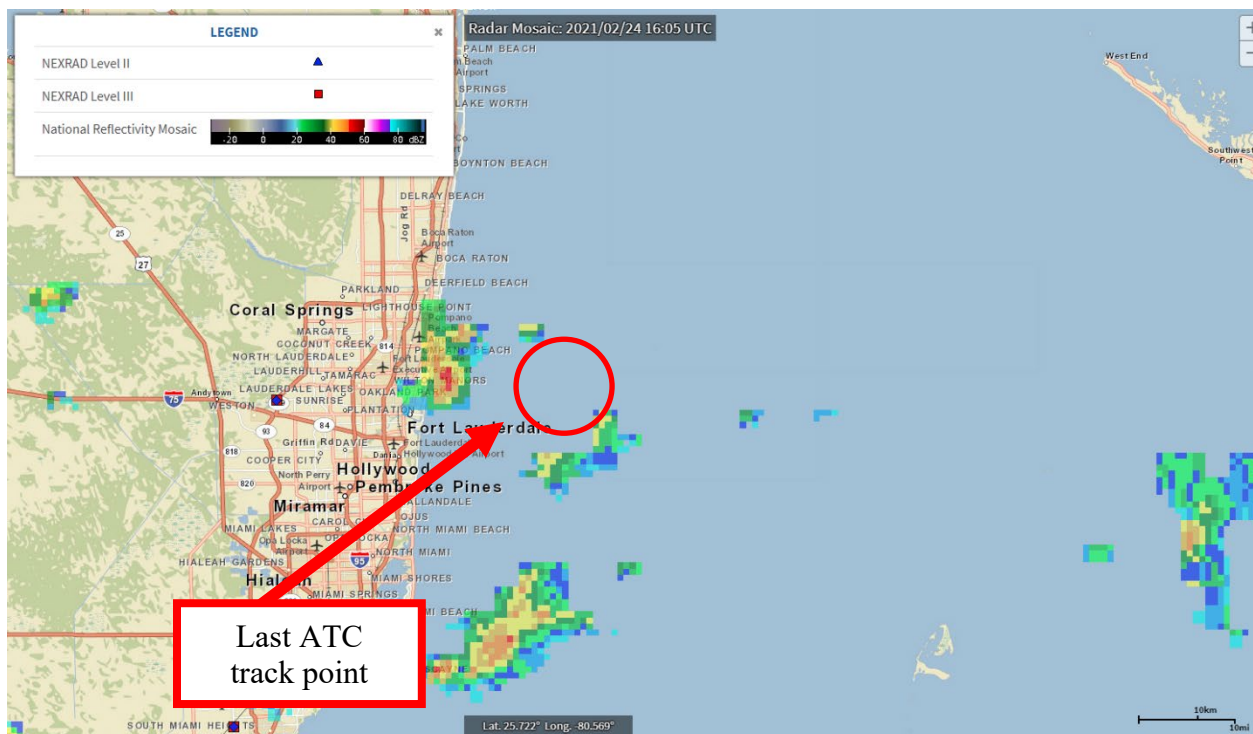


Figure 6 – Regional Composite Reflectivity image for 1105 EST.

6.0 Radar Imagery Information

The closest NWS Weather Surveillance Radar-1988, Doppler (WSR-88D)²⁰ to the accident site was Miami, Florida (KAMX) located 45 miles southwest of the accident site. 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.

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. 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 two different main scanning modes, identified as Mode A and Mode B. Mode A is the precipitation scan and has three common scanning strategies²¹. 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 9 elevation scans during a ten-minute period. During the period surrounding the accident, the KAMX WSR-88D radar was operating in the precipitation mode 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.

²⁰ 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.

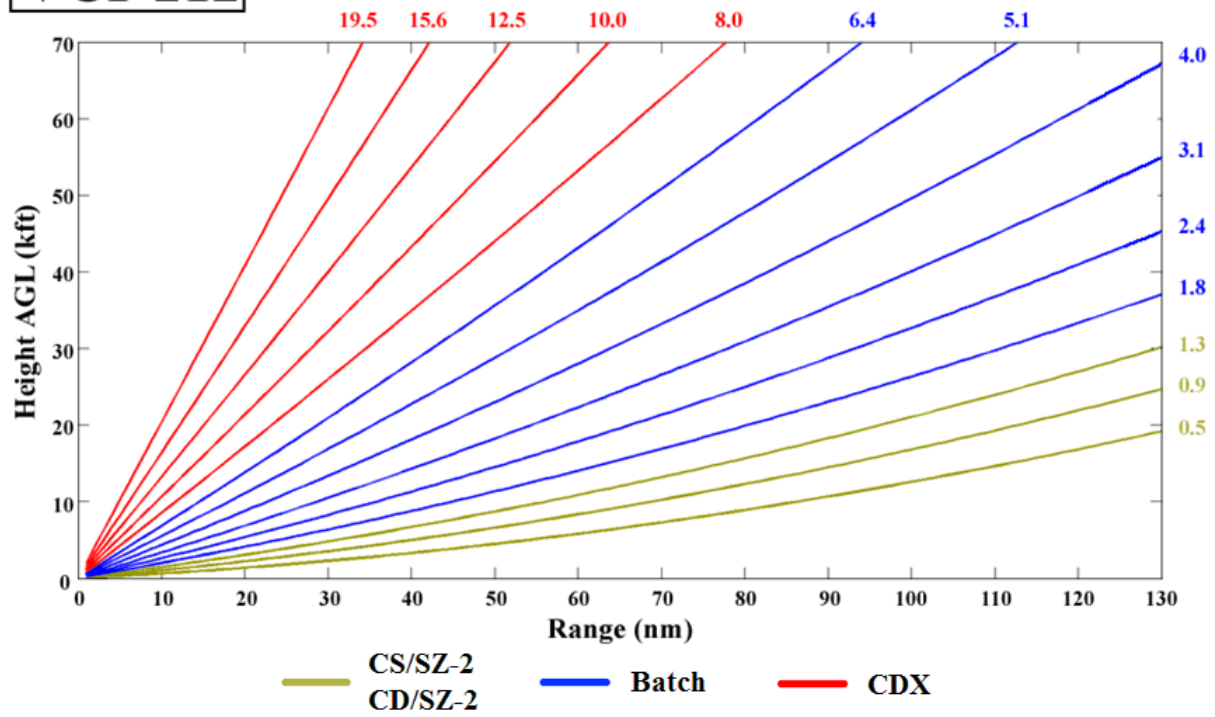
²¹ Contiguous Surveillance (CS)--The low Pulse Repetition Frequency (PRF) scan of the split cut. Gives a high $R_{\max}$ value to determine proper target location and intensity, but a low $V_{\max}$ value limits the velocities that can be measured. Contiguous Doppler (CD)--The high PRF scan of the split 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)

VCP 212



VCP-212 Precipitation Mode Scan Strategy.

6.2 Beam Height Calculation

Assuming standard refraction²² of the KAMX WSR-88D radar beam with the antenna elevation at 111 ft, and considering a beamwidth²³ of 0.95°, the following table shows the approximate heights for the radar beam center, base, and top for antenna elevations over the accident site. These heights have been rounded to the nearest 10 ft.

ANTENNA ELEVATION	BEAM CENTER	BEAM BASE	BEAM TOP
KAMX 0.5°	3,960 ft	1,740 ft	6,180 ft

Based on the radar height calculations, the elevation scans from KAMX listed in the above table depicted the conditions between 1,740 ft and 6,180 ft above msl over the accident site and these scans “saw” the closest altitudes to the aircraft’s altitude before descent.

6.3 Reflectivity

Reflectivity is the measure of the efficiency of a target in intercepting and returning radio energy. With hydrometeors²⁴ 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. FAA Advisory Circular AC 00-24C²⁵, “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.”

²² Standard Refraction in the atmosphere is when the temperature and humidity distributions are approximately average, and values set at the standard atmosphere.

²³ Beamwidth - the angular separation between the half power points on the antenna radiation pattern, where the gain is one half the maximum value.

²⁴ 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.

²⁵

https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1020774

6.4 Base Reflectivity and Lightning Data

Figures 7, 8, and 9 present the KAMX WSR-88D base reflectivity images for the 0.5° elevation scans initiated at 1050:59, 1056:55 and 1102:43 EST, with a resolution of 0.5° X 250 m. Reflectivity values between 20 and 40 dBZ were located along the accident flight track between 1057 and 1103 EST, but no precipitation targets were located above the last ATC track point at 1104 EST.

There were no lightning flashes²⁶ near the accident site at the accident time.²⁷

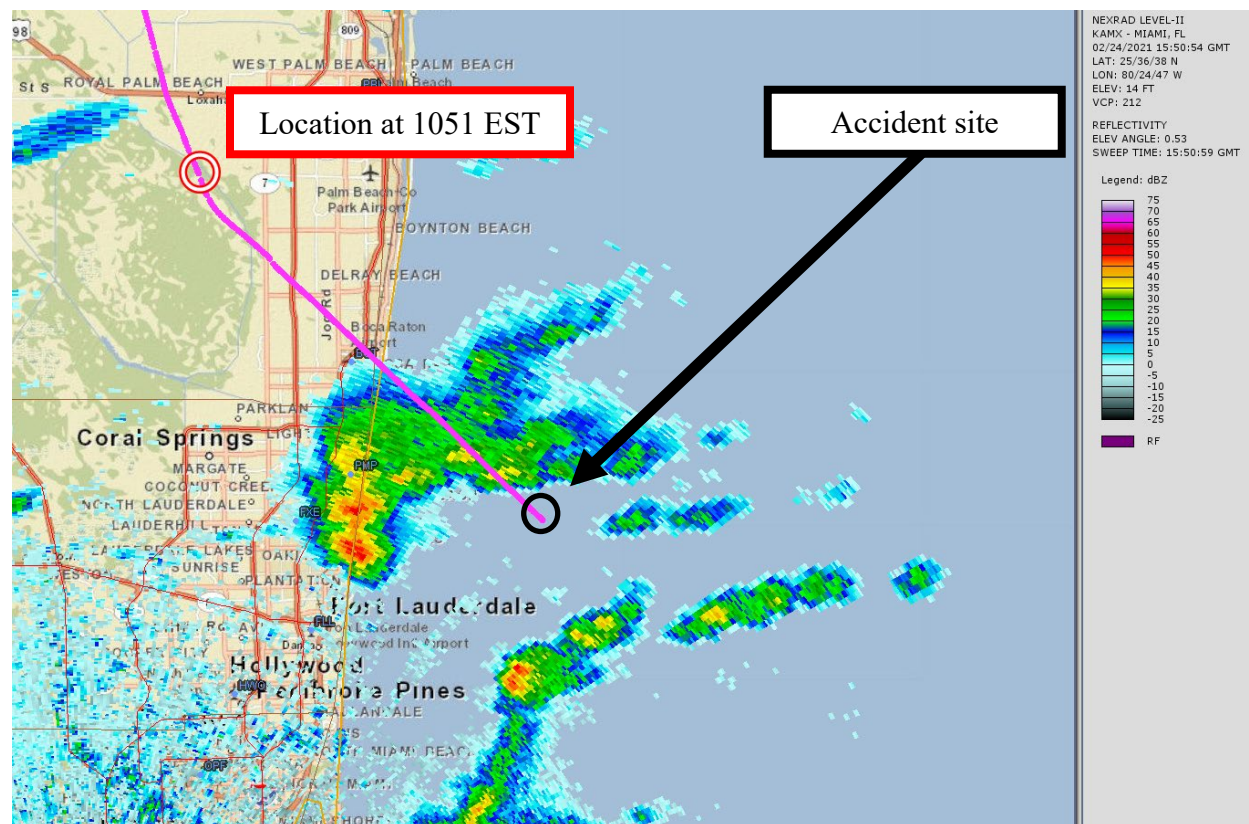


Figure 7 – KAMX WSR-88D reflectivity for the 0.5° elevation scan initiated at 1050:59 EST with the accident site marked with a black circle and the accident flight track marked in pink.

²⁶ Lightning Flash – This is one contiguous conducting channel and all the current strokes/pulses that flow through it. There are two types of flashes: ground flashes and cloud flashes.

²⁷ A review of Earth Networks Total Lightning network was done.

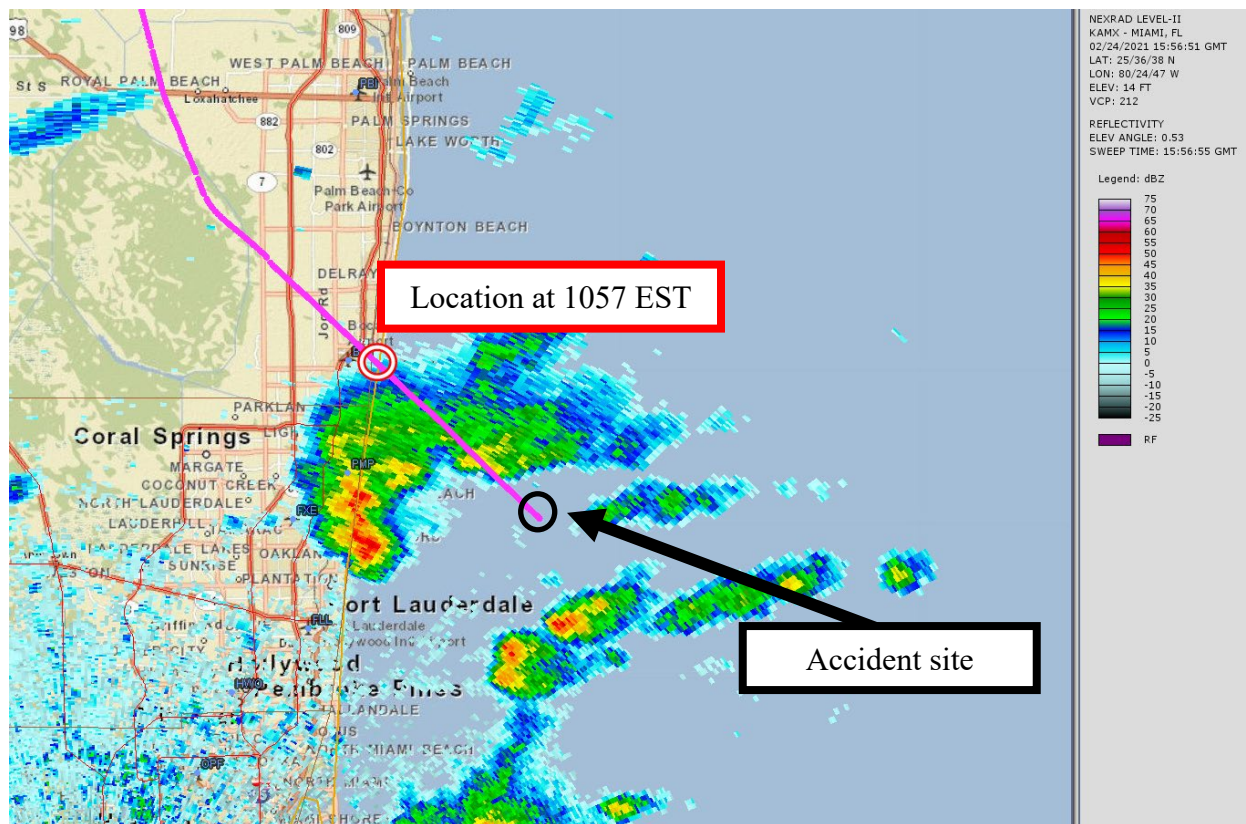


Figure 8 – KAMX WSR-88D reflectivity for the 0.5° elevation scan initiated at 1056:55 EST with the accident site marked with a black circle and the accident flight track marked in pink.

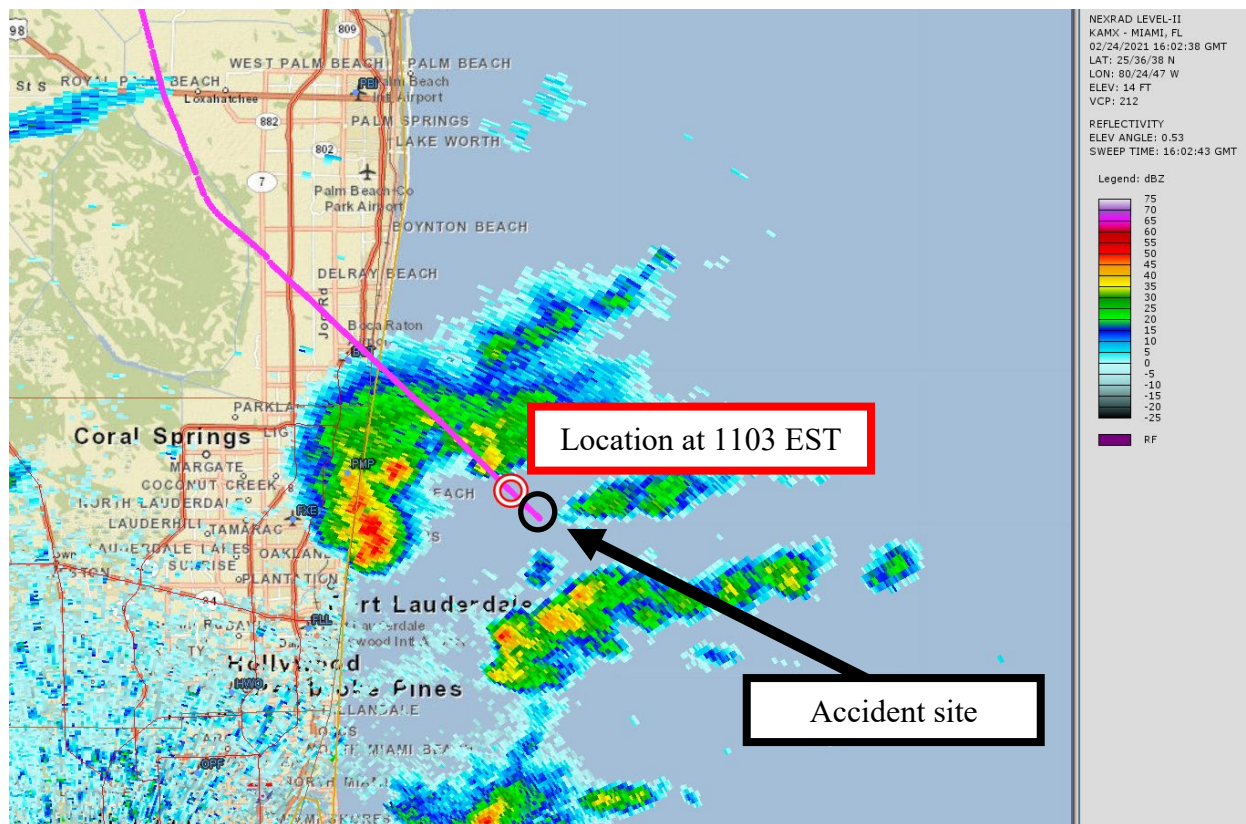


Figure 9 – KAMX WSR-88D reflectivity for the 0.5° elevation scan initiated at 1102:43 EST with the accident site marked with a black circle and the accident flight track marked in pink.

7.0 Pilot Reports

The longline-disseminated pilot reports²⁸ (PIREPs) distributed into the national airspace (NAS) were reviewed from about two hours prior to the accident time to two hours after the accident time and the PIREPs within 75 miles of the accident site below 18,000 ft msl are shown below:

PMP UA /OV PMP/TM 1410/FL010/TP C25B/SK BKN020/WX 1 1/2SM +RA =

PBI UA /OV 10 SW FPR/TM 1419/FL040/TP SR22/SK CLR=

MIA UA /OV DHP135008 /TM 1419 /FL020 /TP C208 /SK SCT /TA 20 /WV 14007KT /TB NEG /RM +TSRA WITH SCT-BKN-TOP100 NORTH OF KMIA=

PBI UA /OV 2 N BCT/TM 1431/FL030/TP C25B/SK OVC030/TB LGT CHOP=

FPR UA /OV FPR180007 /TM 1436 /FL075 /TP E300 /WX FV10SM /TA 15 /WV 27027KT /TB NEG /RM SMOOTH VIS UNRESTRICTED=

FLL UA /OV KTMB-MYCC090010 /TM 1439 /FL045 /TP PA32 /SK BKN015=

²⁸ Only pilot reports with the World Meteorological Organization headers UBFL** were considered. These do not include pilot reports only broadcast via radio.

FLL UA /OV /OV FLL 270005/TM 1510/FL/FL0/TP PC12/SK SCT020=

HWO UA /OV FLL270005 /TM 1510 /FL020 /TP PC12 /SK SCT020=

PBI UA /OV ZFP337032 /TM 1557 /FL045 /TP PA27 /SK SKC /TB NEG /RM 20N WEST END=

PIE UA /OV PIE180002/TM 1610/FL025/TP A320/SK BKN025/RM BASES WEST OF PIE 030; BASES ON FINAL RWY 18 025=

FLL UA /OV FLL270005/TM 1645/FL022/TP G280/SK BKN022=

KMIA UA /OV MIA130009/TM 1719/FL115/TP LJ60/SK TOPPS AT 115=

FLL UA /OV FLL275005/TM 1735/FL015/TP AT76/SK 020 BKN=

8.0 Significant Meteorological Information

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

9.0 Center Weather Service Advisories

The Miami (ZMA) Air Route Traffic Control Center (ARTCC) Center Weather Service Unit (CWSU) was responsible for the accident region. There were no meteorological impact statements (MIS) or Center Weather Advisories (CWA) valid for the accident site at the accident time.

10.0 Airmen's Meteorological Information

There were no Airmen's Meteorological Information (AIRMET) advisories valid for the accident site at the accident time.

11.0 Terminal Aerodrome Forecast

There were no NWS²⁹ Terminal Aerodrome Forecast (TAF) located within 15 miles of the accident site.

12.0 Winds and Temperature Aloft Forecast

The NWS 0854 EST Winds and Temperature Aloft forecast valid for the closest point to the accident site is included below:

²⁹ According to NWS Instruction 10-813: "A 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

FBUS31 KWN0 241354
 FD1US1
 DATA BASED ON 241200Z
 VALID 241800Z FOR USE 1400-2100Z. TEMPS NEG ABV 24000

FT 3000 6000 9000 12000 18000 24000 30000 34000 39000

MIA 1516 2005+11 2707+10 2811+03 2934-05 2943-18 285636 284845 285256

The closest forecast point to the accident site was Miami, Florida, (MIA). The 0854 EST MIA forecast for use between 0900 EST and 1600 EST indicated a wind at 3,000 ft from 150° at 16 knots, a wind at 6,000 ft from 200° at 5 knots with a temperature of 11°C, and a wind at 9,000 ft from 270° at 7 knots with a temperature of 10°C.

13.0 Astronomical Data

The astronomical data obtained for the accident site on February 24, 2021, indicated the following:

SUN	
Begin civil twilight	0624 EST
Sunrise	0647 EST
Accident time	1104 EST³⁰
Sun transit	1233 EST
Sunset	1819 EST
End civil twilight	1842 EST

At the time of the accident the Sun was located at an altitude of 48.56° and azimuth of 145.76°.

E. LIST OF ATTACHMENTS

None.

Submitted by:

Paul Suffern
 Senior Meteorologist

³⁰ Inserted accident time for reference and context.