



NATIONAL TRANSPORTATION SAFETY BOARD

**Office of Aviation Safety
Washington, D.C. 20594**

February 9, 2015

Group Chairman's Factual Report

METEOROLOGY

ERA15FA099

Table Of Contents

ERA15FA099	1
A. ACCIDENT	3
B. METEOROLOGY GROUP	3
C. SUMMARY	3
D. DETAILS OF THE INVESTIGATION	3
E. FACTUAL INFORMATION	4
1.0 Synoptic Situation	4
1.1 Surface Analysis Chart	4
1.2 Weather Depiction Chart	5
1.3 Weather Radar Mosaic	6
1.4 Low-level Significant Weather Prognostic Chart	7
2.0 Surface Observations	8
2.1 Massey Ranch Airpark (X50), New Smyrna Beach, FL	8
2.2 New Smyrna Beach Regional Airport (KEVB), New Smyrna Beach, FL	9
2.3 Daytona Beach International Airport (KDAB), Daytona Beach, FL	10
2.4 Ormond Beach Municipal Airport (KOMN), Ormond Beach, FL	11
2.5 DeLand Municipal Airport – Sidney H. Taylor Field (KDED), DeLand, FL	11
2.6 NASA Shuttle Landing Facility (KTTS), Titusville, FL	12
2.7 Space Coast Regional Airport (KTIX), Titusville, FL	13
2.8 Orlando Sanford International Airport (KSFB), Orlando, FL	13
3.0 Plot of Observations	14
4.0 Upper Air Data	15
5.0 Satellite Data	17
6.0 Pilot Reports	18
7.0 Terminal Aerodrome Forecast	19
8.0 Area Forecast Discussion	20
9.0 Area Forecast	21
10.0 In-Flight Weather Advisories	22
11.0 Winds and Temperature Aloft Forecast	26
12.0 Model Data	26
13.0 Astronomical Data	28

A. ACCIDENT

Location: New Smyrna Beach, Florida

Date: January 13, 2015

Time: About 2058 eastern standard time (0158 UTC¹ on January 14, 2015)

Airplane: Cessna 152; registration N757ZM

B. METEOROLOGY GROUP

Donald E. Eick

Senior Meteorologist

National Transportation Safety Board

Operational Factors Division, AS-30

Washington, D.C. 20594-2000

C. SUMMARY

On January 13, 2015, about 2058 eastern standard time (EST), a Cessna 152, N757ZM, collided with a public beach at New Smyrna Beach, Florida. The commercial pilot was fatally injured and the airplane was substantially damaged by impact forces. The airplane was registered to a private company and was operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Night, instrument meteorological conditions prevailed for the flight, and no flight plan was filed. The local flight originated from Massey Ranch Airpark (X50), Edgewater, Florida, about 2030.

D. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's (NTSB) Senior Meteorologist was not on scene for this investigation and conducted the meteorology phase of the investigation from the Washington D.C. office, collecting data from official National Weather Service (NWS) sources including the Weather Prediction Center (WPC) and the National Climatic Data Center (NCDC). All times are eastern standard time (EST) based upon the 24 hour clock, local time +5 hours to UTC, and UTC=Z. 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 airport and station identifiers use standard International Civil Aviation Organization (ICAO) 4-letter station identifiers versus International Air Transport Association (IATA) 3-letter identifiers which deletes the initial country code designator "K" for U.S. airports. Both codes are both used intermittently in this report.

The accident site was located at latitude 29.047° N and longitude 80.892° W.

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

1.1 Surface Analysis Chart

The southeast section of the NWS Surface Analysis Charts for 1900 and 2200 EST on January 13, 2015 (0000Z and 0300Z on January 14, 2015) are included as figures 1 and 2 respectively, with a circle around the approximate accident site. The 1900 EST chart depicted a cold front immediately south of the area across central Florida, moving southward. The station models behind the cold front depicted northerly winds of 10 knots or less, overcast skies, with numerous stations over northern Florida and Georgia reporting visibility restricted in mist and fog. Ahead of the cold front, light winds and scattered clouds were being reported. Temperatures ranged from the 70s degrees Fahrenheit (F) ahead or south of the front, falling into the 60s to 50s north or behind the front. The station model for Daytona Beach at 1900 EST indicated a wind from the north at approximately 10 knots, overcast skies, temperature of 66° F, and a dew point of 63° F, with a sea level pressure of 1020.3-hectopascals (hPa).

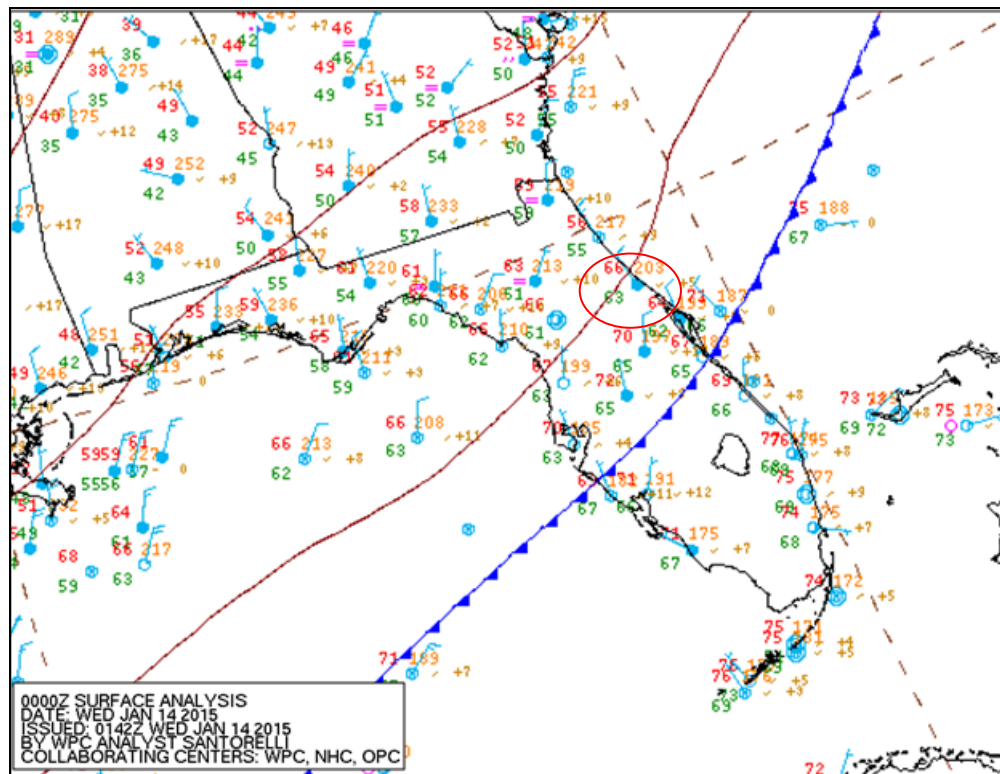


Figure 1 – NWS Surface Analysis Chart for 1900 EST

The chart for 2200 EST continued to depict the cold front moving southward across Florida with several stations north of the front reported northerly wind at approximately 10 knots, overcast clouds, with visibility restricted in mist or fog. The station model for Daytona Beach indicated north wind at approximately 10 knots, visibility restricted in mist, temperature 60° F, dew point 59° F, and sea level pressure 1020.9-hPa. Visibility restrictions in mist were also reported to the south in the Titusville area, and to the north over Jacksonville.

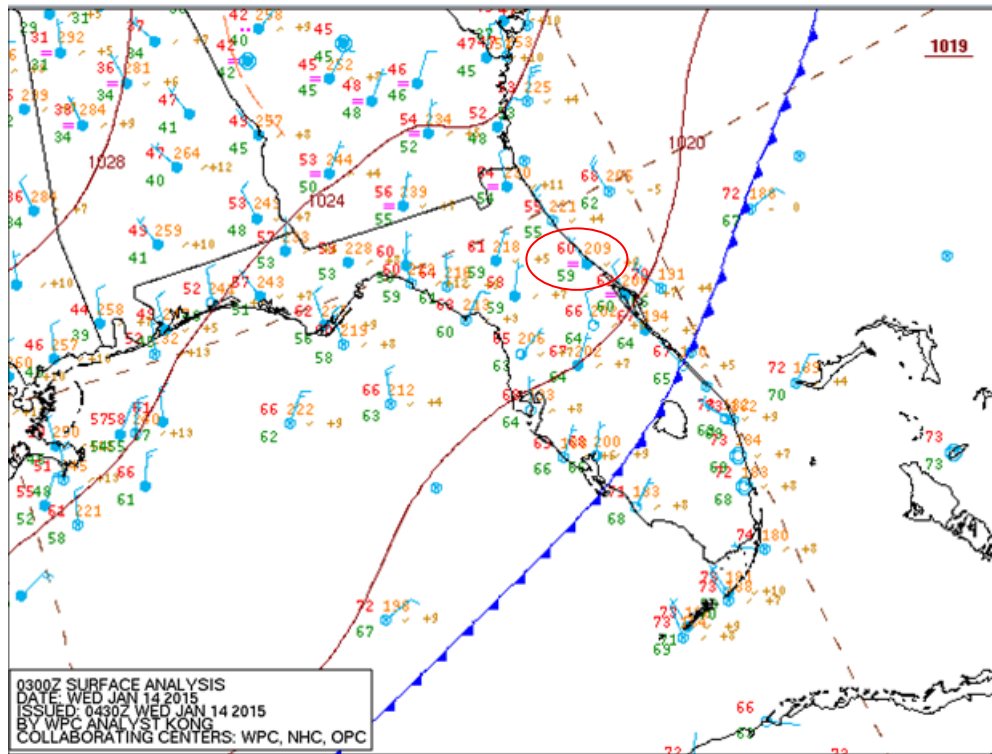


Figure 2 - NWS Surface Analysis Chart for 2200 EST

1.2 Weather Depiction Chart

The southeast section of the NWS Weather Depiction Chart for 2000 EST (0100Z on January 14, 2015) is included as figure 3, and depicted the general flight categories² over the region approximately an hour before the accident. The chart depicted the cold front's position based

² As defined by the NWS and the FAA Aeronautical Information Manual (AIM) section 7-1-7 defines the following general flight categories:

- Instrument Flight Rules (IFR) – ceiling or lowest layer of clouds reported as broken, overcast or the vertical visibility into a surface based obscuration below 1,000 feet above ground level (agl) and/or visibility less than 3 statute mile.
- Marginal Visual Flight Rules (MVFR*) – ceiling from 1,000 to 3,000 feet agl and/or visibility 3 to 5 miles.
- Visual Flight Rules (VFR) – ceiling greater 3,000 feet agl and visibility greater than 5 miles.

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

upon the 1900 EST Surface Analysis Chart position across central Florida immediately south of the accident site. A shaded contour line depicted the instrument flight rule (IFR) conditions that extended behind the cold front and extended from Daytona Beach west and northward over northern Florida, most of Georgia, South Carolina, and portions of North Carolina, Tennessee, and over a large section of Alabama, Mississippi, and Louisiana. A second area of IFR conditions was depicted along the cold front over southeast Florida. An unshaded contour depicted marginal visual flight rule (MVFR) conditions and extended over the New Smyrna Beach area and across central and southeastern Florida. Visual flight rule (VFR) conditions were depicted without a contour and extended over the Tampa Bay area southward and into southern Florida.

The Daytona Beach station model indicated IFR conditions with an overcast ceiling at 600 feet agl.

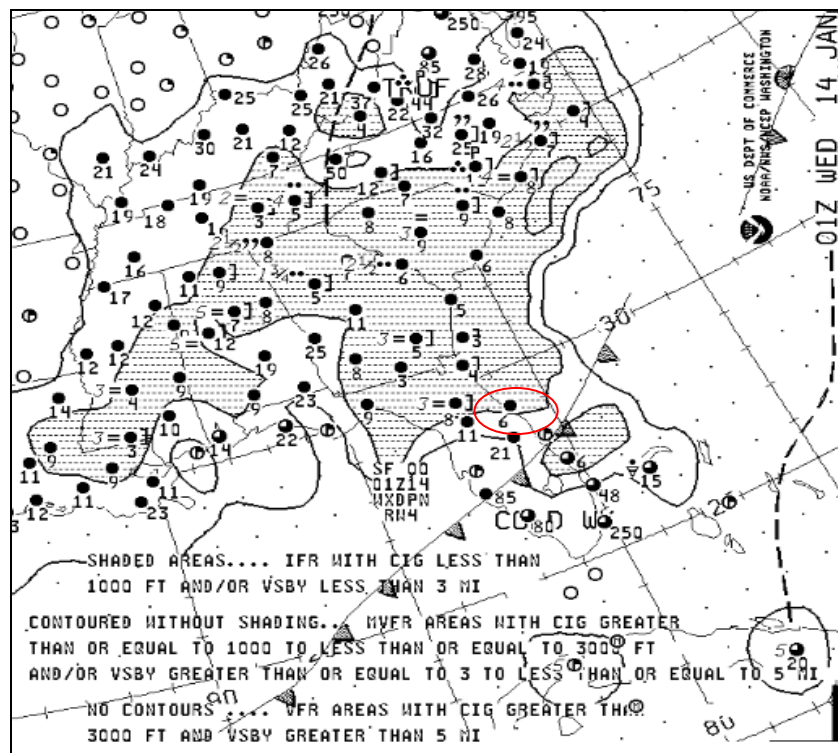


Figure 3 - NWS Weather Depiction Chart for 2000 EST

1.3 Weather Radar Mosaic

The National Center for Atmospheric Research (NCAR) - Research Application Laboratory (RAL) regional radar mosaic image for 2100 EST is included as figure 4. The image depicted no significant meteorological weather echoes in the vicinity of the accident site, with only a few scattered light intensity echoes southeast of the accident site off the Cape Canaveral and southeast Florida coast. No thunderstorms were depicted in the immediate vicinity of the accident site.

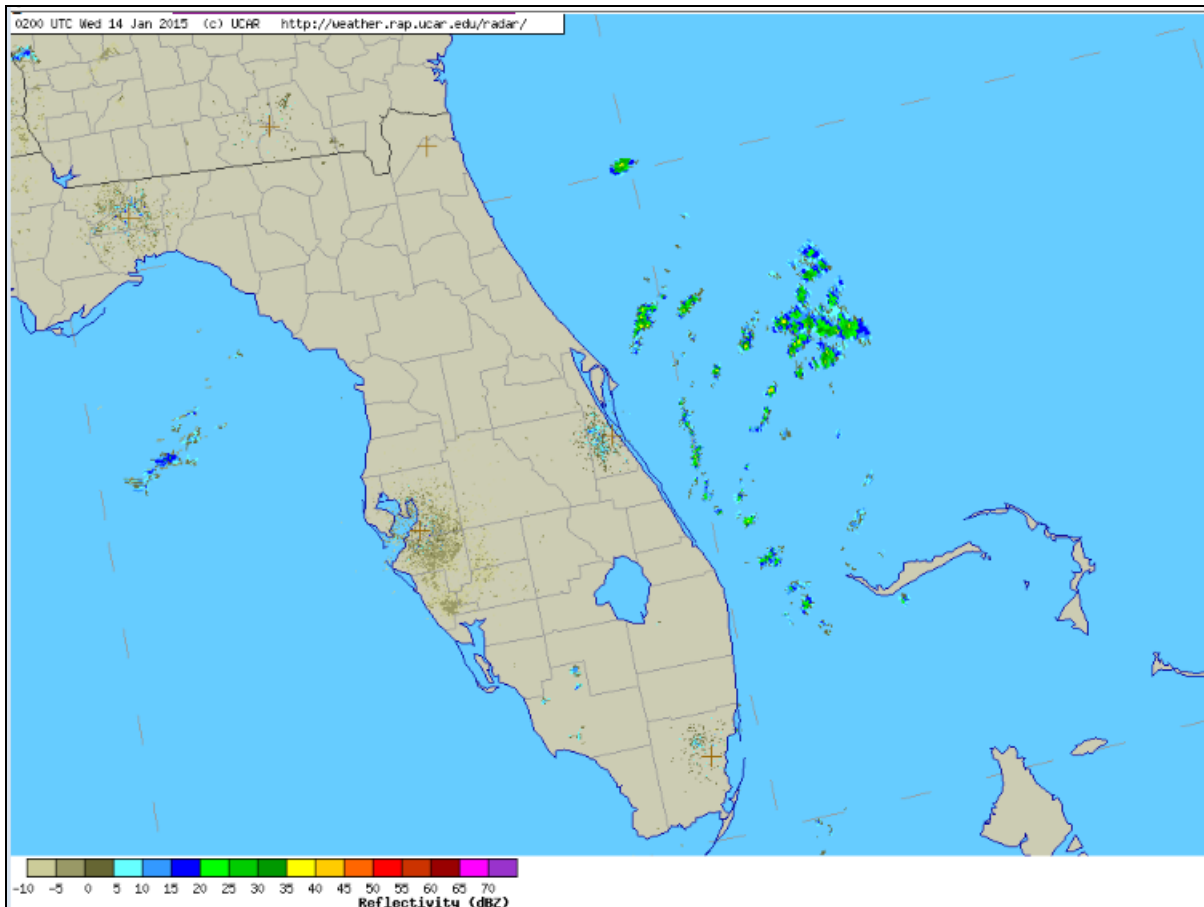


Figure 4 – Regional radar mosaic for 2100 EST

1.4 Low-level Significant Weather Prognostic Chart

The NWS 12 and 24 hour Low-Level Significant Weather Prognostic Chart valid for 0100 and 1300 EST on January 14, 2015 are included as figure 5. The left portion of the chart depicted the forecast conditions during the evening and depicted the cold front moving into the Florida straight off the southeastern coast. Behind the cold front a small area of rain showers was expected along the northeast Florida coast and off shore. The top left portion of the chart depicted the general flight categories expected during the period, including an extensive area of IFR conditions by the red contour line over the entire southeastern United States. A blue scalloped line indicated an expected area of MVFR conditions through the mid-Atlantic coast into the northeast coastal areas and as far west as Texas.

The significant weather prognostic chart indicated that IFR conditions were expected over the region during the evening hours or by 0100 EST.

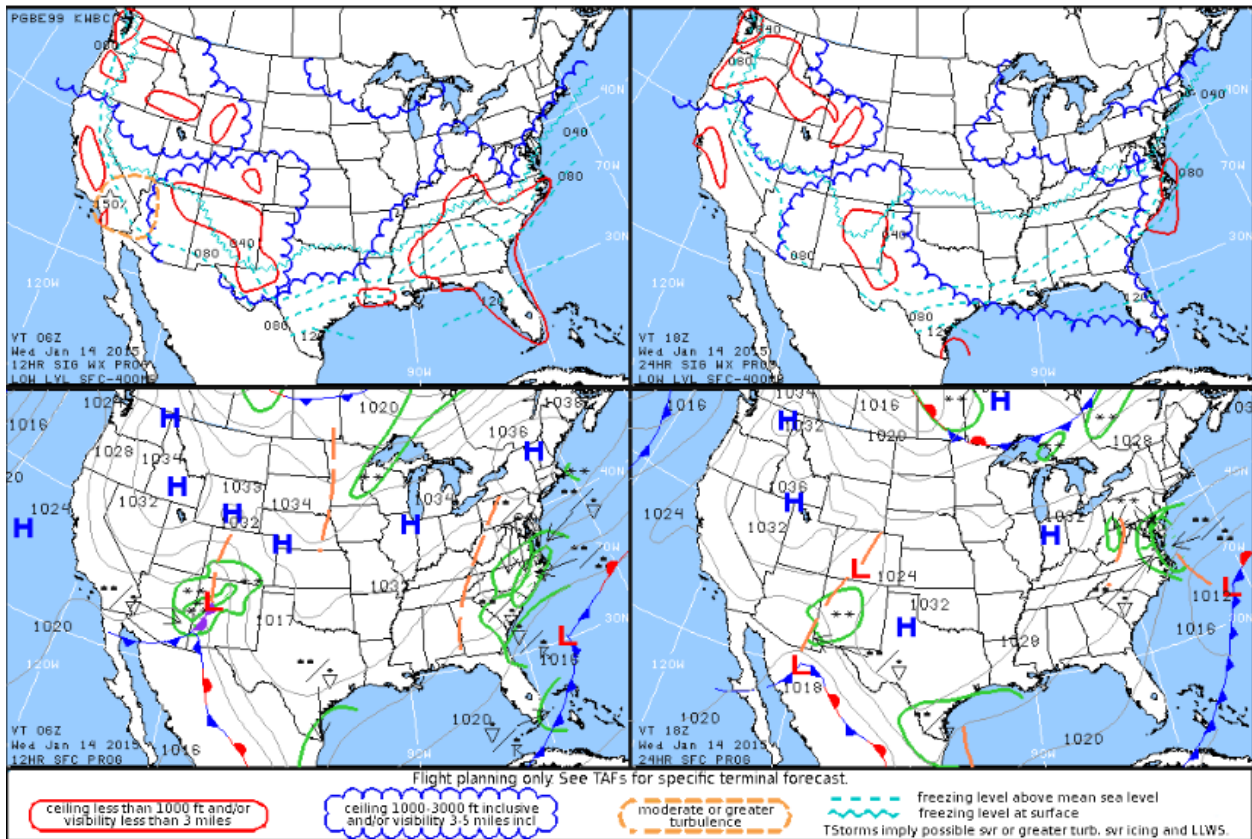


Figure 5 - NWS 12 and 24 hour Low-level Significant Weather Prognostic Chart

2.0 Surface Observations

The official NWS Meteorological Aerodrome Reports (METARs) and special reports (SPECIs) surrounding the period were documented for the region surrounding the accident site. The cloud heights in this section are reported above ground level (agl). The airport reporting locations closest to the accident site are depicted in figure 6.

2.1 Massey Ranch Airpark (X50), New Smyrna Beach, FL

Massey Ranch Airpark (X50), New Smyrna Beach, is located approximately 3 miles south of the city and 4 ½ miles south-southwest of the accident site. The airport has a single runway 18-36 listed at 4,360 feet by 60 feet wide, and lists an airport elevation of 11 feet. The airport has no weather reporting capability.

The accident airplane first departed the Massey Ranch Airpark at approximately 1830 EST for some pattern work, and landed about 1950. The airplane took off again about 2040 EST and continued additional pattern work until at approximately 2047 EST when the pilot lost sight of the airport due to weather conditions. The initial departure time is used in this report as the assumed weather briefing period to evaluate any NWS products.

2.2 New Smyrna Beach Regional Airport (KEVB), New Smyrna Beach, FL

New Smyrna Beach Municipal Airport (KEVB), New Smyrna Beach, was located approximately 5 miles north of the departure airport at an elevation of 10 feet, and less than 3 miles west of the accident site. The airport had an Automated Weather Observation System (AWOS) and reported the following conditions at the approximate time of the accident:

New Smyrna Beach Regional Airport (KEVB) special weather observation at 2055 EST, wind from 350° at 8 knots, visibility 8 statute miles, ceiling overcast at 500 feet, temperature 17° Celsius (C), dew point 16° C, altimeter 30.14 inches of mercury (Hg).

The raw observations and general flight categories³ reported in the 36 hours prior⁴ to the accident were as follows:

LIFR METAR KEVB 121147Z 0000KT 1SM FG VV002 17/17 A3023 RMK FIRST=
LIFR METAR KEVB 121247Z 0000KT 1/4SM FG OVC001 17/17 A3023=
IFR SPECI KEVB 121324Z 0000KT 2SM BR BKN023 18/18 A3024=
MVFR SPECI KEVB 121347Z 0000KT 5SM BR FEW025 20/20 A3024=
VFR METAR KEVB 121450Z 0000KT 9SM FEW025 24/22 A3025=
VFR METAR KEVB 121547Z 14011KT 10SM SCT021 25/21 A3025=
MVFR METAR KEVB 121647Z 14011G15KT 10SM BKN021 26/21 A3021=
VFR METAR KEVB 121750Z 13011G17KT 10SM BKN031 25/20 A3017=
MVFR METAR KEVB 121947Z 15008KT 7-SM BKN030 23/20 A3014=
MVFR METAR KEVB 122047Z 13008KT 4SM BR BKN060 23/20 A3014=
IFR METAR KEVB 122147Z 21010G22KT 1SM RABR OVC005 17/18 A3021=
LIFR METAR KEVB 122247Z 36010KT 1SM RABR OVC002 18/18 A3022=
IFR METAR KEVB 122347Z 36010KT 2SM RABR OVC040 18/18 A3019=
MVFR METAR KEVB 130047Z 36005KT 5SM RABR OVC060 18/17 A3020=
VFR METAR KEVB 130147Z 0000KT 10SM BKN070 17/17 A3016=
VFR METAR KEVB 130247Z 14005KT 10SM BKN070 17/17 A3016 RMK LAST=
MVFR METAR KEVB 131147Z 0000KT 10SM OVC019 17/16 A3014 RMK FIRST=
MVFR METAR KEVB 131247Z 34008KT 10SM OVC021 17/16 A3016=
MVFR METAR KEVB 131347Z 34007KT 10SM BKN023 17/17 A3019=
LIFR SPECI KEVB 131430Z 34007KT 10SM BKN003 17/17 A3019=

³ The NWS and FAA Aeronautical Information Manual (AIM) section 7-1-7 define the following general flight categories:

- Low Instrument Flight Rules (LIFR*) – ceiling or lowest layer of clouds reported as broken, overcast or the vertical visibility into a surface based obscuration below 500 feet 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 feet agl and/or visibility 3 to 5 miles.
- Visual Flight Rules (VFR) – ceiling greater 3,000 feet agl and visibility greater than 5 miles.

* By definition, IFR is a ceiling less than 1,000 feet 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 feet agl and visibility greater than 5 miles while MVFR is a sub-category of VFR.

⁴ The 36 hour history is included in this report to document the unsettled weather pattern and precipitation before the accident, and shows the diurnal period of fog formation reported in the previous day. Fog formation is more common with precipitation having occurred within the past 24 hours.

LIFR METAR KEVB 131447Z 01008KT 10SM BKN004 18/17 A3018=
LIFR METAR KEVB 131547Z 01008KT 10SM OVC004 19/17 A3019=
LIFR METAR KEVB 131647Z 01011KT 1SM BR OVC003 19/17 A3017=
LIFR METAR KEVB 131747Z 35009KT 5SM BR OVC003 19/17 A3015=
MVFR METAR KEVB 131847Z 35011KT 7SM SCT060 OVC022 20/17 A3014=
MVFR METAR KEVB 131947Z 35011KT 7SM OVC018 20/17 A3013=
MVFR METAR KEVB 132050Z 36011KT 10SM OVC030 19/17 A3012=
IFR METAR KEVB 132147Z 36011KT 5SM BR OVC005 18/17 A3012=
IFR SPECI KEVB 132215Z 36011KT 5SM BR OVC005 18/17 A3012=
1st Departed 2330Z
IFR METAR KEVB 132250Z 35011KT 8SM OVC005 18/17 A3013=
IFR METAR KEVB 132350Z 35008KT 8SM OVC005 17/16 A3013=
Departed pattern at 0130Z
IFR METAR KEVB 140150Z 35008KT 8SM OVC005 17/16 A3014=
IFR SPECI KEVB 140155Z 35008KT 8SM OVC005 17/16 A3014=
Accident 0158Z

2.3 Daytona Beach International Airport (KDAB), Daytona Beach, FL

The next closest weather reporting station was Daytona Beach International Airport (KDAB), located approximately 14 miles northwest of the departure airport at an elevation of 34 feet. The airport had a control tower and a federally installed and maintained Automated Surface Observation System (ASOS). The following weather conditions were reported surrounding the time of the accident:

Daytona Beach International Airport (KDAB) weather at 2053 EST, wind from 020° at 9 knots, visibility 10 miles, ceiling overcast at 700 feet, temperature 18° C, dew point 16° C, and altimeter 30.14 inches of Hg.

Daytona Beach International Airport (KDAB) special weather at 2131 EST, wind from 360° at 11 knots gusting to 17 knots, visibility 1 mile⁵, ceiling overcast at 400 feet, temperature 16° C, dew point 15° C, and altimeter 30.15 inches of Hg.

Daytona Beach International Airport (KDAB) special weather at 2146 EST, wind from 360° at 8 knots, visibility ½ mile in fog, ceiling overcast at 300 feet, temperature 16° C, dew point 15° C, and altimeter 30.15 inches of mercury. Remarks: automated observation system, tower visibility 1mile, temperature 15.6° C, dew point 15.0° C.

The raw observations and general flight category were as follows surrounding the period:

IFR SPECI KDAB 132119Z 02009KT 10SM BKN007 BKN011 OVC022 21/17 A3012 RMK AO2 T02060172=
IFR METAR KDAB 132153Z 35009KT 10SM BKN009 BKN011 OVC022 20/17 A3012 RMK AO2 SLP198
T02000172=
IFR METAR KDAB 132253Z 36007KT 9SM OVC008 19/17 A3013 RMK AO2 SLP202 T01890172=
MVFR SPECI KDAB 132337Z 36009KT 10SM SCT007 BKN025 OVC032 19/17 A3013 RMK AO2 T01890172=
IFR METAR KDAB 132353Z 35008KT 10SM BKN007 BKN025 OVC034 19/17 A3013 RMK AO2 SLP203
T01890172 10222 20189 53005=

⁵ The special report was missing the weather conditions at the time, which should have been reported as fog.

IFR METAR KDAB 140053Z 01007KT 10SM BKN006 BKN025 OVC034 18/17 A3014 RMK AO2 SLP206
T01830172=
IFR METAR KDAB 140153Z 02009KT 10SM OVC007 18/16 A3014 RMK AO2 SLP206 T01780161=
Accident 0158Z
LIFR⁶ SPECI KDAB 140231Z COR 36011G17KT 1SM OVC004 16/15 A3015 RMK AO2 T01610150=
LIFR SPECI KDAB 140246Z 36008KT 1/2SM FG OVC003 16/15 A3015 RMK AO2 TWR VIS 1 T01560150=
LIFR METAR KDAB 140253Z 35006KT 1/2SM FG OVC003 16/15 A3015 RMK AO2 TWR VIS 1 SLP209
T01560150 53006=
LIFR METAR KDAB 140353Z 35009KT 1/2SM FG OVC003 15/14 A3015 RMK AO2 TWR VIS 1 SLP207
T01500144=
LIFR SPECI KDAB 140432Z 35010KT 1/4SM FG OVC003 16/14 A3014 RMK AO2 TWR VIS 1 T01560144=
LIFR METAR KDAB 140453Z 34007KT 1/4SM FG OVC002 16/15 A3014 RMK AO2 TWR VIS 1 SLP204
T01560150 402220150=

2.4 Ormond Beach Municipal Airport (KOMN), Ormond Beach, FL

Ormond Beach Municipal Airport (KOMN), was located approximately 17 miles northwest of the accident site at an elevation of 28 feet. The airport had an AWOS and reported the following conditions before the time of the accident:

Ormond Beach Municipal Airport (KOMN) weather at 1850 EST, wind from 350° at 5 knots, visibility 7 miles, ceiling overcast at 500 feet, temperature and dew point 17° C, and altimeter 30.14 inches of Hg.

The raw observations were as follows:

MVFR METAR KOMN 132050Z 02008KT 7SM SCT010 BKN022 19/17 A3012=
IFR METAR KOMN 132150Z 02008KT 7SM BKN009 OVC013 18/17 A3012=
IFR METAR KOMN 132250Z 35006KT 7SM BKN007 OVC037 18/17 A3014=
IFR METAR KOMN 132350Z 35005KT 7SM OVC005 17/17 A3014= (Last report)
Accident
LIFR METAR KOMN 141145Z 35008G15KT 1/2SM FG OVC001 12/12 A3015 RMK FIRST
LIFR METAR KOMN 141250Z 35008KT 1/2SM FG OVC001 13/12 A3015

2.5 DeLand Municipal Airport – Sidney H. Taylor Field (KDED), DeLand, FL

DeLand Municipal Airport (KDED) was located approximately 20 miles west of the departure airport at an elevation of 79 feet. The airport had an AWOS without a precipitation discriminator, which could not report weather type and issued observations every 20 minutes. The following weather conditions were reported at the approximate time of the accident:

DeLand Municipal Airport (KDED) weather at 2055 EST, automated, wind from 360° at 5 knots, visibility 10 miles, ceiling overcast at 500 feet, temperature and dew point missing, altimeter 30.15 inches of Hg.

⁶ LIFR – Low Instrument Flight Rule conditions is a subset of IFR and is defined as ceiling below 500 feet agl and/or visibility less than 1 statute mile.

The raw observations surrounding the period were as follows:

MVFR METAR KDED 132115Z AUTO 03008KT 10SM FEW020 BKN027 A3011 RMK AO1=
MVFR METAR KDED 132135Z AUTO 02008KT 10SM BKN015 BKN027 22/17 A3012 RMK AO1=
MVFR METAR KDED 132155Z AUTO 03007KT 10SM BKN015 OVC020 20/17 A3012 RMK AO1=
MVFR METAR KDED 132215Z AUTO 02007KT 10SM BKN015 OVC020 A3012 RMK AO1=
MVFR METAR KDED 132235Z AUTO 03008KT 10SM BKN015 OVC020 20/17 A3013 RMK AO1=
MVFR METAR KDED 132255Z AUTO 01006KT 10SM OVC020 A3014 RMK AO1=
MVFR METAR KDED 132315Z AUTO 03006KT 10SM FEW011 OVC020 A3014 RMK AO1=
MVFR METAR KDED 132335Z AUTO 36007KT 10SM SCT011 BKN022 OVC030 A3014 RMK AO1=
VFR METAR KDED 132355Z AUTO 36006KT 10SM SCT009 SCT024 OVC032 A3014 RMK AO1=
VFR METAR KDED 140015Z AUTO 36008KT 10SM SCT009 OVC034 18/17 A3014 RMK AO1=
IFR METAR KDED 140035Z AUTO 34007KT 10SM BKN007 OVC036 A3015 RMK AO1=
IFR METAR KDED 140055Z AUTO 35007KT 10SM OVC007 A3015 RMK AO1=
IFR METAR KDED 140115Z AUTO 36006KT 10SM OVC006 A3015 RMK AO1=
IFR METAR KDED 140135Z AUTO 35006KT 10SM OVC006 A3015 RMK AO1=
IFR METAR KDED 140155Z AUTO 36005KT 10SM OVC005 A3015 RMK AO1=
Accident 0158Z
IFR METAR KDED 140215Z AUTO 36005KT 10SM OVC005 A3015 RMK AO1=
IFR METAR KDED 140235Z AUTO 02005KT 10SM OVC005 A3015 RMK AO1=
IFR METAR KDED 140255Z AUTO 01005KT 10SM OVC005 A3015 RMK AO1=
IFR METAR KDED 140315Z AUTO 36005KT 10SM OVC005 A3015 RMK AO1=
UNK METAR KDED 140335Z AUTO 01009KT 10SM A3015 RMK AO1=
UNK METAR KDED 140355Z AUTO 34009KT 10SM 17/17 A3015 RMK AO1=
LIFR METAR KDED 140415Z AUTO 36007KT 10SM OVC003 17/16 A3015 RMK AO1=
LIFR METAR KDED 140435Z AUTO 01008KT 10SM OVC003 16/15 A3015 RMK AO1=
LIFR METAR KDED 140455Z AUTO 36009KT 10SM OVC004 16/15 A3014 RMK AO1=

2.6 NASA Shuttle Landing Facility (KTTS), Titusville, FL

The closest reporting station to the south of the accident site was from the NASA Shuttle Landing Facility (KTTS), Titusville, located approximately 25 miles southeast of the departure airport at an elevation of 9 feet. The following weather conditions were reported at the approximate time of the accident:

NASA Shuttle Landing Facility weather at 2058 EST, automated, wind from 360° at 9 knots, visibility 10 miles, ceiling broken at 600 feet agl, overcast at 3,700 feet, temperature 18° C, dew point 16° C, and altimeter 30.12 inches of Hg.

The raw observations surrounding the period were as follows:

VFR METAR KTTS 132158Z AUTO 01009KT 10SM SCT005 18/17 A3009 RMK AO2 SLP193 T01820165=
LIFR SPECI KTTS 132248Z AUTO 35009KT 10SM BKN004 18/17 A3009 RMK AO2 BKN V SCT=
LIFR METAR KTTS 132258Z AUTO 36011KT 10SM BKN003 18/17 A3009 RMK AO2 SLP193 T01790168=
LIFR METAR KTTS 132358Z AUTO 36008KT 10SM OVC003 18/17 A3011 RMK AO2 SLP199 60000
T01790169 10230 20177 53006=
UNK SPECI KTTS 140025Z AUTO 35010KT M M M M RMK AO2 \$=
LIFR SPECI KTTS 140030Z AUTO 35008KT 10SM BKN004 18/17 A3011 RMK AO2 BKN V OVC=
LIFR METAR KTTS 140058Z AUTO 35009KT 10SM BKN004 18/17 A3012 RMK AO2 SLP203 T01790169=
IFR SPECI KTTS 140103Z AUTO 35009KT 10SM OVC005 18/17 A3011 RMK AO2=
Accident 0158Z
IFR METAR KTTS 140158Z AUTO 36009KT 10SM BKN006 OVC037 18/16 A3012 RMK AO2 SLP203

T01750164=
VFR SPECI KTTS 140208Z AUTO 36007KT 10SM SCT006 OVC039 17/16 A3012 RMK AO2=
IFR SPECI KTTS 140223Z AUTO 36008KT 10SM BKN005 OVC039 17/16 A3012 RMK AO2 CIG 005V039
BKN V SCT=
LIFR SPECI KTTS 140238Z AUTO 36011G15KT 10SM OVC004 17/16 A3012 RMK AO2=
LIFR METAR KTTS 140258Z AUTO 36011KT 350V050 6SM BR OVC002 17/16 A3013 RMK AO2 SLP206
T01680158 52007=
LIFR SPECI KTTS 140313Z AUTO 36010KT 2 1/2SM BR OVC002 17/16 A3013 RMK AO2 VIS 2 1/2V4=
LIFR SPECI KTTS 140318Z AUTO 36010KT 1 3/4SM BR OVC002 17/16 A3013 RMK AO2 VIS 1 3/4V3=
LIFR SPECI KTTS 140328Z AUTO 36008KT 3/4SM BR VV002 17/16 A3012 RMK AO2 VIS 3/4V1 3/4 RVRNO=
LIFR METAR KTTS 140358Z AUTO 01011KT 3/4SM BR VV002 17/16 A3011 RMK AO2 SLP199 T01700162
RVRNO=
LIFR SPECI KTTS 140408Z AUTO 36009KT 1SM BR VV002 17/16 A3011 RMK AO2 RVRNO=
LIFR SPECI KTTS 140418Z AUTO 36011KT 1 1/4SM BR OVC002 17/16 A3011 RMK AO2=
LIFR SPECI KTTS 140433Z AUTO 35008KT 1SM BR VV002 17/16 A3011 RMK AO2 RVRNO=
LIFR SPECI KTTS 140438Z AUTO 35008KT 1 1/4SM BR OVC002 17/16 A3011 RMK AO2=
LIFR METAR KTTS 140458Z AUTO 36009KT 1 1/2SM BR OVC002 17/17 A3010 RMK AO2 SLP196
T01710165 402300160=

2.7 Space Coast Regional Airport (KTIX), Titusville, FL

Space Coast Regional Airport (KTIX) was located approximately 28 miles south of the departure airport in Titusville, at an elevation of 34 feet. The AWOS reported the following conditions at the approximate time of the accident:

Space Coast Regional Airport (KTIX) weather at 2047 EST, wind from 340° at 8 knots , visibility 7 miles, scattered clouds at 700 feet, temperature and dew point 18° C, altimeter 30.12 inches of Hg. Remarks: last observation of the day.

The raw observations were as follows:

VFR METAR KTIX 132152Z 35014KT 7SM SCT020 20/18 A3009=
VFR METAR KTIX 132252Z 35010KT 7SM SCT120 18/18 A3009=
VFR METAR KTIX 132350Z 35012KT 7SM SCT006 18/18 A3011=
VFR METAR KTIX 140047Z 35008KT 7SM SCT007 18/18 A3012=
VFR METAR KTIX 140147Z 34008KT 7SM SCT007 18/18 A3012 RMK LAST=
Accident 0158Z

2.8 Orlando Sanford International Airport (KSFB), Orlando, FL

Orlando Sanford International Airport (KSFB), Orlando, was located 20 miles southwest of the departure airport at an elevation of 55 feet. The airport had an ASOS and reported the following weather conditions at the approximate time of the accident:

Orlando Sanford International Airport (KSFB) weather at 2100 EST, wind from 360° at 9 knots, visibility 10 miles, ceiling broken at 1,000 feet, overcast at 3,900 feet, temperature 19° C, dew point 17° C, altimeter 30.14 inches of Hg.

The raw observations were as follows:

MVFR METAR KSF 132153Z 04009KT 10SM BKN020 OVC027 22/17 A3010 RMK AO2 SLP190 T02220172=
MVFR METAR KSF 132253Z 03008KT 10SM OVC021 21/17 A3011 RMK AO2 SLP197 T02060167=
MVFR METAR KSF 132353Z 01007KT 10SM SCT022 OVC030 20/17 A3013 RMK AO2 SLP201 T02000167
10239 20200 53010=
MVFR SPECI KSF 140016Z 01010KT 10SM FEW012 BKN024 OVC030 19/17 A3013 RMK AO2 T01940167=
VFR SPECI KSF 140039Z 35007KT 10SM FEW011 SCT023 OVC033 19/17 A3013 RMK AO2 T01940167=
VFR METAR KSF 140053Z 36006KT 10SM FEW011 OVC033 19/17 A3013 RMK AO2 SLP204 T01940167=
VFR METAR KSF 140153Z 01008KT 10SM SCT010 OVC039 19/17 A3013 RMK AO2 SLP203 T01890167=
Accident 0158Z
MVFR SPECI KSF 140200Z 36009KT 10SM BKN010 OVC039 19/17 A3014 RMK AO2 T01890167=
IFR SPECI KSF 140211Z 01007KT 10SM OVC009 19/17 A3014 RMK AO2 T01890167=
IFR METAR KSF 140253Z 01008KT 10SM OVC008 18/17 A3014 RMK AO2 SLP205 T01830167 51004=
IFR METAR KSF 140353Z AUTO 36009KT 10SM OVC006 18/17 A3013 RMK AO2 SLP202 T01830167=
IFR METAR KSF 140453Z AUTO 36012KT 10SM OVC006 18/16 A3012 RMK AO2 SLP197 T01780161
402390156=

3.0 Plot of Observations

Figure 6 is a plot of the observations at 2100 EST from the NWS Aviation Weather Center weather tool, with the station models color coded for the flight categories.

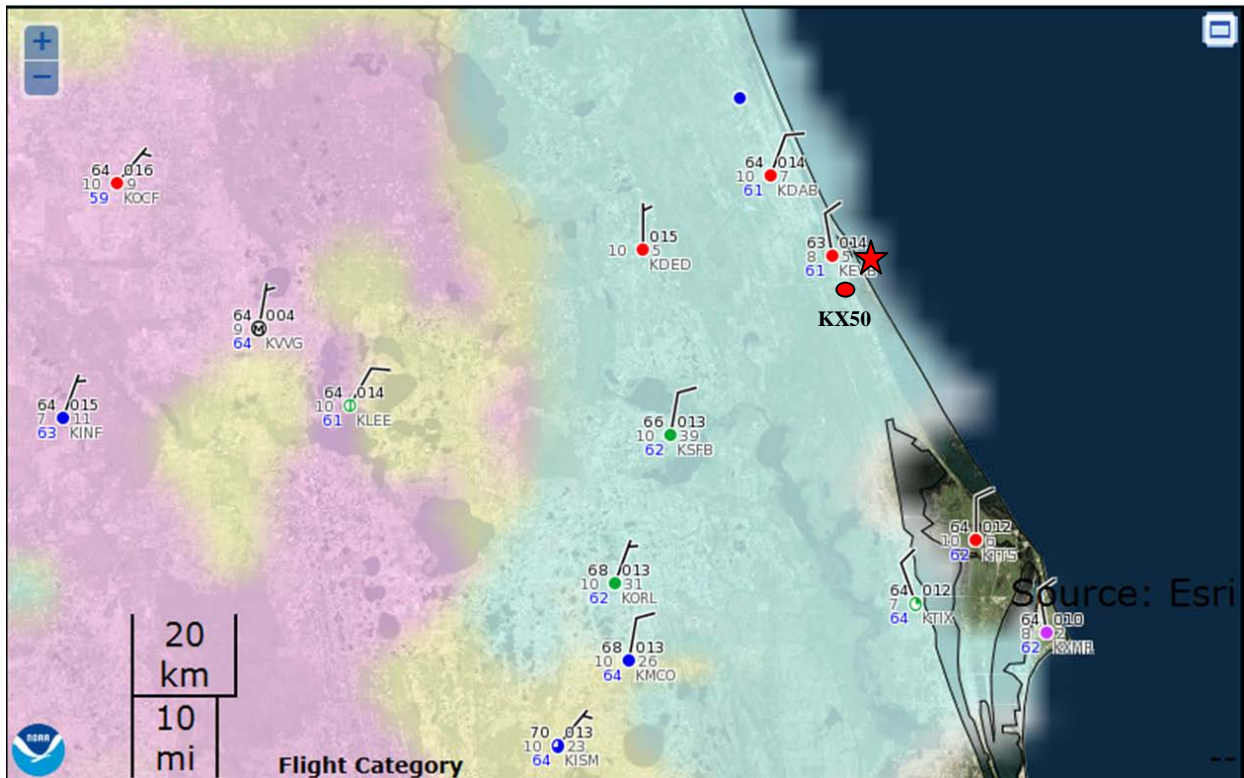


Figure 6 – plot of observations at 2100 EST

4.0 Upper Air Data

The closest upper air sounding or rawinsonde observation (RAOB) was from the NWS Jacksonville Forecast office (KJAX), site number 72206, located approximately 100 miles north-northwest of the accident site at an elevation of 30 feet. The 1900 EST (0000Z on January 14, 2015) sounding from the surface to 500-hPa or 18,000 feet was plotted on a standard Skew-T log P diagram⁷ utilizing RAOB⁸ software and is included as figure 7.

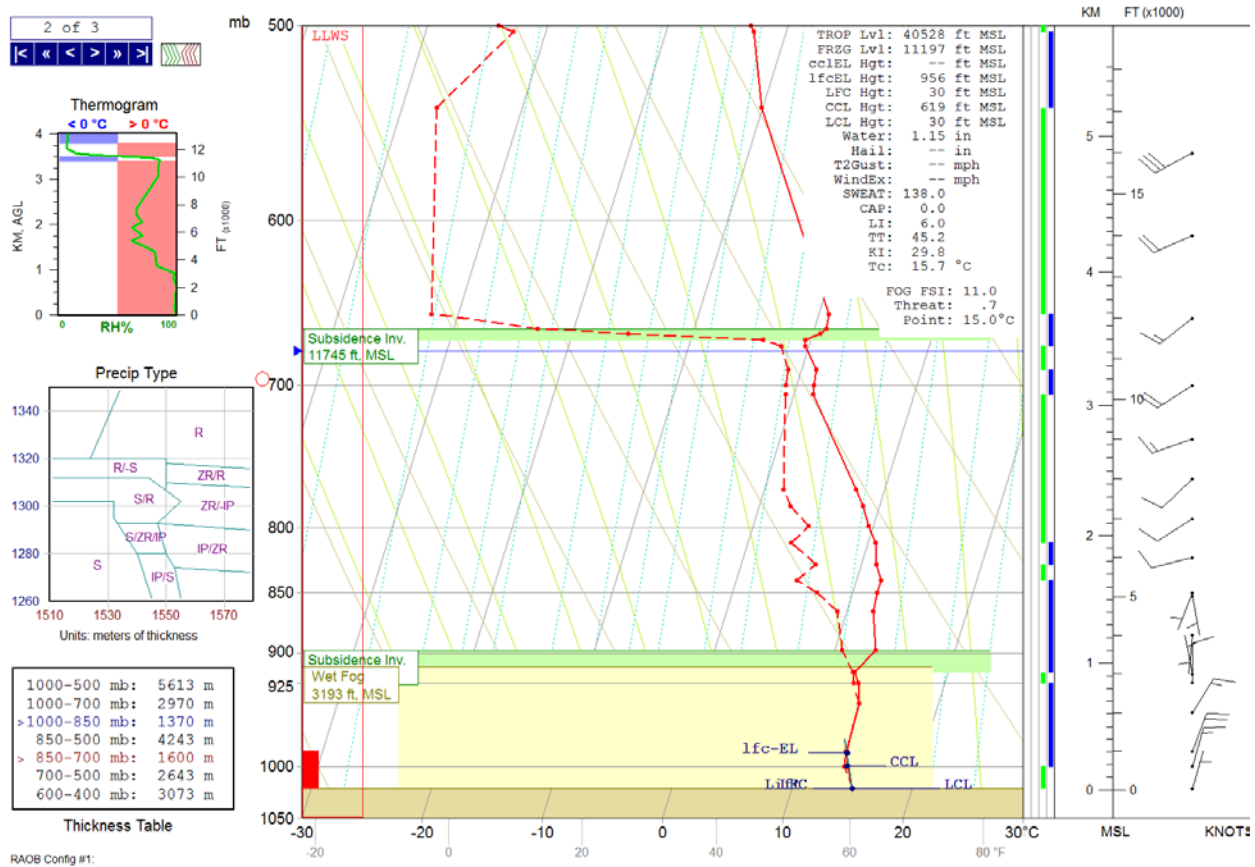


Figure 7 – Jacksonville (KJAX) 1900 EST sounding

The sounding indicated the surface conditions as a northerly wind from the 015° at 3 knots, temperature and dew point 15° C. The lifted condensation level (LCL)⁹ and level of free convection (LFC)¹⁰ were both identified at the surface, with the convective condensation level

⁷ 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.

⁸ RAOB – (The complete Rawinsonde Observation program) is an interactive sounding analysis program developed by Environmental Research Services, Matamoras, Pennsylvania.

⁹ Lifting Condensation Level (LCL) - The height at which a parcel of moist air becomes saturated when it is lifted dry adiabatically.

¹⁰ Level of Free Convection (LFC) -The level at which a parcel of saturated air becomes warmer than the

(CCL)¹¹ at 500 feet agl. The sounding was saturated from the surface through 3,600 feet with relative humidity greater than 98%. An inversion was noted at this level (green shading) with drier air above to approximately 10,000 feet, where moisture again increased to 80% relative humidity through 11,500 feet. The freezing level was identified at approximately 11,000 feet and is indicated by a thin blue line on the plot in the immediate vicinity of a second inversion. The sounding was stable with a Lifted Index (LI)¹² of 6.0, and supported stratiform type clouds and fog.

The sounding wind profile indicated the low-level winds were from the north to northeast through 3,500 feet, which shifted to the south and then west-southwest with height above the low-level temperature inversion. At approximately 1,000 feet a small increase in wind to 20 knots was noted implying some potential low-level wind shear, but at a low magnitude or “light” category. The mean 0 to 6 kilometer or 18,000 feet wind was from 247° at 15 knots. Wind speeds were less than 30 knots through 15,000 feet and no significant turbulence was indicated below 18,000 feet.

Figure 8 is a copy of the observed and derived sounding parameters below 10,000 feet, and includes the following fields; height, pressure (PRES), temperature (T), dew point (Td), relative humidity (RH), wind direction and speed, and derived potential for clear air turbulence (CAT), low-level wind shear (LLWS), and icing conditions.

surrounding air and begins to rise freely. This occurs most readily in a conditionally unstable atmosphere.

¹¹ Convective Condensation Level (CCL) - The height to which a parcel of air, if heated sufficiently from below, will rise adiabatically until condensation starts. This is typically used to identify the base of cumuliform clouds, which are normally produced from surface heating and thermal convection.

¹² Lifted Index (LI) - A common measure of atmospheric instability. Its value is obtained by computing the temperature that air near the ground would have if it were lifted to 500-hPa or approximately 18,000 feet and comparing that temperature to the actual temperature at that level. Negative values indicate instability - the more negative, the more unstable the air is, and the stronger the updrafts are likely to be with any developing thunderstorms.

Height (ft-MSL)	Pres (mb)	T (C)	Td (C)	RH (%)	DD/FF (deg/ kts)	CAT (AF)	LLWS	Icing - Type (S-F clouds)
30	1021	15.0	15.0	100	15/3		LIGHT	
608	1000	14.0	13.8	99	15/15		LIGHT	
999	986	13.6	13.5	99	20/19			
2000	951				30/16			
2235	943	13.4	13.4	100				
2768	925	12.8	12.4	97	360/8			
3038	916	12.2	12.1	99	350/6			
3617	897	13.4	10.6	83				
4000	885				185/3			
4620	865	12.2	9.2	82				
5000	853				170/4			
5102	850	12.0	7.0	71	200/5			
5428	840	12.0	5.0	62				
5823	828	11.2	6.2	71				
6000	823				255/8			
6392	811	10.6	3.6	62				
6799	799	9.6	4.6	71				
7000	793				235/10			
7315	784	8.6	2.6	66				
7733	772	7.6	1.6	66				
8000	764				225/11			
9000	736				250/16			
10126	706	1.6	-0.7	85				

Figure 8 - Sounding data below 10,000 feet

5.0 Satellite Data

The Geostationary Operational Environmental Satellite number 13 (GOES-13) data was obtained from an archive at the Space Science Engineering Center (SSEC) at the University of Wisconsin-Madison, located in Madison, Wisconsin, and processed using the Safety Board's Man-computer Interactive Data Access System (McIDAS) software. The infrared long wave imagery (band 4) at a wavelength of 10.7 microns (μm) and a resolution of 4 km, provided a standard satellite image with radiative cloud top temperatures.

Figure 9 is the GOES-13 infrared image at 2100 EST (0200Z) at 4X magnification. The image depicts an extensive area of low stratiform clouds by the low gray tones over the accident site and over northern Florida into Georgia, with a band of higher cirrus clouds stretching east-to-west across the region immediately north of the accident site. The radiative cloud top temperature over the low stratiform clouds and the accident site was 274° Kelvin (K) or 0.8° C, which corresponded to cloud tops near 10,000 feet. The image depicted no significant thunderstorms in the vicinity of the accident site.

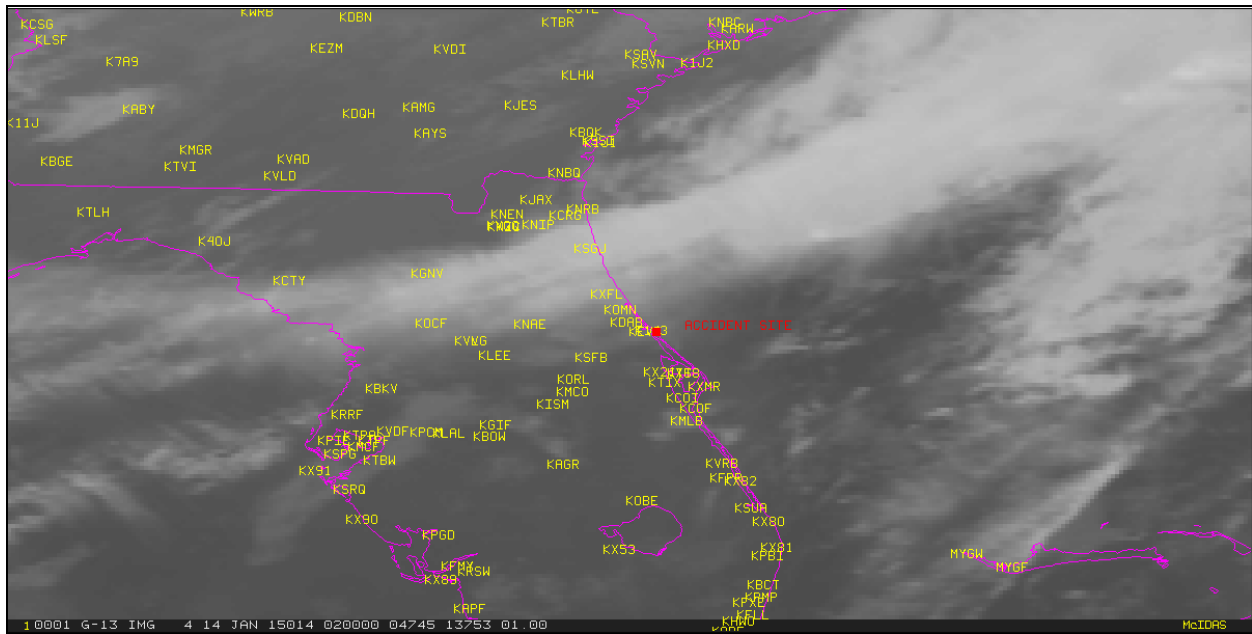


Figure 9 - GOES-13 infrared satellite image at 2100 EST

6.0 Pilot Reports

The following pilot reports (PIREPs) were recorded over Florida surrounding the period between 1400 and 0200 EST. The reports were transcribed from standard code and abbreviations into plain language and were as follows:

Ormond Beach Airport (OMN) routine pilot report (UA); Over 3 miles south of Ormond Beach VORTAC¹³; Time – 1412 EST (1912Z); Flight level - 2,200 feet; Type aircraft – Diamond Twin Star light multiengine airplane (DA42); Sky conditions – broken clouds at 1,800 feet with tops at 2,200 feet.

Jacksonville International Airport (JAX) routine pilot report (UA); Over – Jacksonville; Time – 1612 EST (2112Z); Flight level – unknown; Type aircraft – Embraer EMB-145 regional jet (E145); Sky cover – overcast at 400 feet with tops at 3,000 feet; Remarks – reported during descent into runway 8.

Jacksonville International Airport (JAX) routine pilot report (UA); Over – Jacksonville; Time – 1625 EST (2125Z); Flight level – unknown; Type aircraft – Embraer EMB-190 medium range air carrier jet (E190); Sky cover – overcast at 300 feet; Remarks – reported during descent.

Jacksonville International Airport (JAX) routine pilot report (UA); Over – Jacksonville; Time – 1817 EST (2317Z); Flight level – unknown; Type aircraft – Embraer EMB-170 regional air carrier jet (E170); Sky cover – overcast at 200 feet; Remarks – reported during descent for runway 8.

¹³ VORTAC – is a VHF omnidirectional range (VOR) beacon and a tactical air navigation system (TACAN) beacon for distance measuring. The system provides both azimuth and distance for air navigation.

Accident 0158Z

Palm Beach International Airport (PBI), West Palm Beach, FL, routine pilot report (UA); Over - 15 miles west of Palm Beach VORTAC; Time - 2230 EST (0330Z); Flight level - 2,000 feet; Type aircraft - Boeing 757-200 series air carrier jet (B752); Sky cover - broken to overcast clouds bases unknown with tops at 800 feet; Weather - fog; Wind - from 350 at 7 knots; Remarks - reported during descent.

Orlando Executive Airport (ORL) routine pilot report (UA); Over - 5 miles north of Orlando International Airport (MCO); Time - 2308 EST (0408Z); Flight level - unknown; Type aircraft - Boeing 767-200 series heavy air carrier jet (B762); Sky cover - overcast at 500 feet with tops at 1,000 feet.

Palm Beach International Airport (PBI) routine pilot report (UA); Over - from 10 miles east of Palm Beach to the airport; Time - 2325 EST (0425Z); Flight level - 3,000 feet; Type aircraft - Dassault Falcon 900 business jet (F900); Sky cover - overcast clouds at 300 feet with tops at 3,000 feet; Weather - fog; Remarks - reported during descent on final for runway 28R, tower visibility 2 miles with sector visibility to the southeast less than 2 miles.

There were no other pilot reports or cloud top reports in the NWS or FAA database surrounding the period.

7.0 Terminal Aerodrome Forecast

The NWS Melbourne Weather Service Forecast Office (WSFO) had responsibility for the region. The closest Terminal Aerodrome Forecast (TAF) to the accident site was issued for Daytona Beach International Airport (KDAB). While a TAF is valid for a 5 mile radius from the center of the airport complex, it is often used by pilots because it provides a detailed forecast of wind, visibility, weather, and sky conditions at more specific time periods than other NWS forecasts. Since there is no TAF issued for New Smyrna Beach, Daytona Beach was the closest forecast available. The forecast available for preflight weather planning before departure of N757ZM was issued at 1510 EST, and expected MVFR conditions to prevail with a ceiling broken at 2,000 feet agl and unrestricted visibility. After 2100 EST the conditions were expected to lower with visibility restricted to 3 miles in mist and a ceiling broken at 1,500 feet agl. IFR conditions were expected after 0900 through 1300 EST on January 14, 2015. The forecast was as follows:

*TAF KDAB 132010Z 1320/1418 02011KT P6SM BKN020 BKN040 BKN100
FM140200 35004KT P6SM BKN015 OVC040
FM140800 34005KT 3SM BR BKN010 OVC020
FM141400 35009KT P6SM BKN005 BKN015*

The next scheduled forecast was issued at 1830 EST (2330Z), or at the estimated time the flight departed. The updated forecast changed the onset of IFR conditions to 1900 EST with a ceilings overcast at 800 feet agl. After 0100 EST the visibility was expected to lower to 3 miles

in mist and ceilings overcast at 600 feet. Those conditions were expected to prevail through 1000 EST on January 14, 2015. The forecast was as follows:

*TAF KDAB 132330Z 1400/1424 36007KT P6SM OVC008
FM140600 35006KT 3SM BR OVC006
FM141500 35010KT P6SM BKN010 OVC020
FM141700 36011KT P6SM BKN025 BKN040=*

The forecast was amended after the accident at 2207 EST (0307Z) for LIFR conditions with visibility 2 miles in mist with ceilings overcast at 400 feet agl, with a temporary period between 2200 and 0100 EST of visibility 1/2 mile in fog. The IFR conditions were expected to continue until the next morning at 1000 EST. The forecast was as follows:

*TAF AMD KDAB 140307Z 1403/1424 35006KT 2SM BR OVC004
TEMPO 1403/1406 1/2SM FG
FM140600 35006KT 2SM BR OVC004
TEMPO 1406/1410 1/2SM FG OVC003
FM141000 35007KT 2SM BR OVC004
TEMPO 1410/1412 1SM BR
FM141500 35010KT P6SM BKN010 OVC020
FM141700 36011KT P6SM BKN025 BKN040=*

8.0 Area Forecast Discussion

The NWS Melbourne WSFO issued the following area forecast discussion (AFD) bulletin at 1511 EST regarding their public and the aviation forecasts during the period:

*FXUS62 KMLB 132011 2015013 2011
AFDMLB
AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE MELBOURNE FL
311 PM EST TUE JAN 13 2015
.DISCUSSION...
...FOG/LOW CLOUDS A GOOD BET AGAIN OVERNIGHT...
CURRENT-TONIGHT...LOW CLOUDS STILL PLAGUING PARTS OF THE COVERAGE WARNING
AREA FROM NEAR TITUSVILLE TO KISSIMMEE NORTHWARD. MARINE FOG HAS ALSO BEEN
AN ISSUE ALONG THE VOLUSIA COUNTY COAST. NEXRAD 88D SHOWS LIGHT PRECIP FROM
NEAR TITUSVILLE SOUTHWESTWARD ACROSS ECFL THIS AFTERNOON. WITH RECENT
WIDESPREAD RAINFALL AND LIGHT WINDS AGAIN OVERNIGHT THE STAGE SEEMS SET FOR
ANOTHER OVERNIGHT BOUT OF FOG/LOW CLOUDS. CURRENT NNE/NE WINDS TO AROUND
10 MPH ARE FORECAST TO VEER TO N/NW THIS EVENING AND OVERNIGHT WITH SPEEDS
AROUND 5 MPH OR LESS.
A SMALL THREAT FOR SHOWERS WILL CONTINUE THIS AFTERNOON WITH BEST CHANCES
FROM KISSIMMEE RIVER TO MELBOURNE SOUTHWARD BUT IT APPEARS MOST LOCATIONS
WILL REMAIN DRY. WILL KEEP A SMALL POP THIS EVENING FOR ALONG THE COAST AND
OKEECHOBEE COUNTY...CONTINUING OVERNIGHT ALONG THE TREASURE COAST. THE MID
AND UPPER LEVEL SUPPORT IS JUST NOT THERE COMPARED WITH YESTERDAY. CLOUD
COVER HAS KEPT THE ATMOSPHERE FROM DESTABILIZING AS WELL. OVERNIGHT LOWS IN
THE UPPER 50S TO NEAR 60 DEGREES OVER THE INTERIOR/NORTH OF I-4...LOWER TO
MID 60S ALONG THE SOUTH BREVARD/TREASURE COASTS.
WED...LIKELY FOG/LOW CLOUDS GREET THIS DAY AND IT WILL TAKE SOME TIME FOR THIS*

STUFF TO LIFT/BURN-OFF. MAINLY CLOUDY SKIES AGAIN FORECAST. A WEAK SURFACE TROUGH PASSING THROUGH THE SOUTHEAST STATES WILL ALLOW DRIER AIR TO FILTER INTO THE AREA. NW/N WINDS WILL INCREASE TO 10-15 MPH THROUGH THE DAY. CONDITIONS MOSTLY DRY BUT WILL HAVE TO HOLD ONTO A SMALL THREAT FOR A LIGHT SHOWER/SPRINKLES ALONG THE COAST AND OVER THE COASTAL WATERS. CONTINUE TO UNDERCUT MOS MAX TEMPERATURES WITH U60S/L70S ALONG AND NORTH OF I-4 AND MIDDLE 70S SOUTHWARD.

&&

.AVIATION...MVFR/IFR CIGS FOR MUCH OF PERIOD WITH LOCAL LIFR OVERNIGHT/EARLY WED MORNING IN MESSY/UNSETTLED WX PATTERN. PLENTIFUL MOISTURE TO PROMOTE FOG DEVELOPMENT OVERNIGHT/EARLY WED MORNING. ACTIVITY WILL BE SLOW TO BURN OFF/LIFT ON WED. N/NNE WINDS TO 10 KTS BECOMING 5 KTS OR LESS AND BACKING TO NNW/NW THIS EVENING/OVERNIGHT. GREATEST PRECIP CHANCES SOUTH OF MCO AND ALONG THE TREASURE COAST INTO THIS EVENING AND ALONG THE COAST ON WED...THOUGH PERCENTAGES WILL REMAIN LOW.

The aviation section of the forecast discussion indicated that MVFR to IFR ceilings were expected through the period with local LIFR conditions expected overnight into early Wednesday morning on January 14, 2015. This discussion was available on the NWS AWC website (<http://aviationweather.gov/fcstdisc>) and the Melbourne local forecast site (<http://www.srh.noaa.gov/mlb/>). There were no updates until after the accident.

9.0 Area Forecast

The NWS Area Forecast (FA) is a forecast of visual flight rules (VFR) clouds and weather conditions over an area as large as the size of several states. It must be used in conjunction with the AIRMET Sierra (IFR) bulletin for the same area in order to get a complete picture of the weather. The area forecast together with the AIRMET Sierra bulletin are used to determine forecast enroute weather and to interpolate conditions at airports which do not have a terminal forecast (TAF) issued. The NWS Aviation Weather Center (AWC) located in Kansas City, Missouri, issues the FA at regular intervals and issues special reports as necessary, usually in the form of an AIRMET. The Miami (KMIA) regional forecast that was current at the time of the accident was issued at 1345 EST and valid through 0200 EST on January 14, 2015. The forecast was as follows:

The synopsis indicated a cold front moving southward across Florida during the period, with the northern portion of Florida expecting broken ceilings at 1,500 feet with clouds layered to 25,000 feet, and visibility 3 to 5 miles in mist. The outlook from 0200 to 0800 EST warned of IFR conditions due to low ceilings and visibility in mist.

*-MIAC FA 131845
SYNOPSIS AND VFR CLDS/WX
SYNOPSIS VALID UNTIL 141300
CLDS/WX VALID UNTIL 140700...OTLK VALID 140700-141300
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 TROF OVR SE WV-SW GA. CDFNT 130SE ILM-SRN FL PEN-200SW SRQ. 13Z TROF SW PA-SW WV-NW GA-CNTRL FL PNHDL. CDFNT OVR FL STRAITS. TROF OVR NRN NC CSTLN-VA CSTLN-SRN NJ CSTLN.

FL

*PNHDL...BKN010 LYRD FL250. VIS 3-5SM BR. OTLK...IFR CIG BR.
NRN PEN...BKN015 LYRD FL250. OCNL VIS 3-5SM BR. OTLK...IFR CIG BR.
CNTRL PEN...BKN040 LYRD FL250. ISOL -SHRA. BECMG 2023 WDLY SCT -SHRA/ISOL -TSRA. CB TOP FL380. BECMG 0003 BKN020. ISOL -SHRA/-TSRA. BECMG 0406 OCNL VIS 3-5SM BR. OTLK...IFR CIG BR.
SRN PEN...BKN040 LYRD FL250. ISOL -SHRA/-TSRA. CB TOP FL400. BECMG 2023 SCT -SHRA/-TSRA. BECMG 0003 ISOL -SHRA/-TSRA. BECMG 0406 BKN030. ISOL -SHRA/-TSRA. OTLK...MVFR CIG.
KEYS...SCT030. OTLK...VFR BECMG 1012 MVFR CIG.*

10.0 In-Flight Weather Advisories

The NWS issues in-flight weather advisories designated as Severe Weather Forecast Alerts (AWW), Convective SIGMETs (WST), SIGMETs (WS), Center Weather Advisories (CWA), and AIRMETs (WA). In-flight advisories serve to notify en route pilots of the possibility of encountering hazardous flying conditions, which may not have been forecast at the time of the preflight briefing. Whether or not the condition described is potentially hazardous to a particular flight is for the pilot to evaluate on the basis of experience and the operational limits of the aircraft.

During the period there were no Convective SIGMETs, SIGMETs, or Severe Weather Forecast Alerts were issued over Florida. The only advisories current were a series of AIRMETs issued by the NWS Aviation Weather Center (AWC) located in Kansas City, Missouri. AIRMETs are issued every 6 hours with amendments as necessary. At 1545 EST the following AIRMETs were issued and valid until 2200 EST.

*MIAS WA 132045
AIRMET SIERRA UPDT 3 FOR IFR AND MTN OBSCN VALID UNTIL 140300*

*AIRMET IFR...NC SC GA FL AND CSTL WTRS
FROM 160SE SIE TO 190ESE ECG TO 130SSE ILM TO 220SE CHS TO 120ENE OMN TO 30E TRV
TO 40E SRQ TO 40N PIE TO 100SSE SJI TO 40W CEW TO 50SW PZD TO GQO TO HMV TO
30NE GSO TO ECG TO 160SE SIE
CIG BLW 010/VIS BLW 3SM PCPN/BR. CONDS CONTG BYD 03Z THRU 09Z.*

*AIRMET MTN OBSCN...NC SC GA
FROM HMV TO 20NW GSO TO CLT TO ATL TO GQO TO HMV
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 160SE SIE-190ESE ECG-130SSE ILM-210ENE TRV-20E PBI- 20WNW RSW-
60WNW PIE-130ESE LEV-40W CEW-50SW PZD-GQO-HMV-20NE ECG- 160SE SIE
CIG BLW 010/VIS BLW 3SM PCPN/BR. CONDS CONTG THRU 09Z.*

....

*WAUS42 KPCI 132045
WA2T*

2015013 2042

*-MIAT WA 132045
AIRMET TANGO UPDT 3 FOR TURB AND STG SFC WNDZ VALID UNTIL 140300*

*.
NO SGFNT TURB EXP OUTSIDE OF CNVTV ACT.*

*.
OTLK VALID 0300-0900Z...STG SFC WNDZ NC MA RI NY NJ MD DE VA CSTL WTRS
BOUNDED BY 50SE SIE-190S ACK-160SE SIE-190ESE ECG-50ESE ORF-50SE SIE
SUSTAINED SURFACE WINDS GTR THAN 30KT EXP. CONDS DVLPG 06-09Z.
CONDS CONTG THRU 09Z.*

WAUS42 KKCI 132045 2015013 2046

WA2Z

-MIAZ WA 132045

AIRMET ZULU UPDT 3 FOR ICE AND FRZLVL VALID UNTIL 140300

*.
AIRMET ICE...NC SC GA PA OH WV VA
FROM AIR TO 30NE EKN TO 20SE LYH TO 40S GSO TO 20SE ODF TO GQO TO
HNV TO HNN TO 40ESE CVG TO AIR
MOD ICE BTN FRZLVL AND 140. FRZLVL SFC-090. CONDS CONTG BYD 03Z THRU 09Z.*

*.
OTLK VALID 0300-0900Z...ICE NC SC GA NJ PA OH WV MD DC DE VA AND CSTL WTRS
BOUNDED BY 20NNW AIR-40SSW JST-110S HTO-110SE SIE-30ESE ORF-50SW ILM-
20SSE ODF-GQO-HMV-HNN-20ESE CVG-20NNW AIR
MOD ICE BTN FRZLVL AND 140. FRZLVL SFC-090. CONDS CONTG THRU 09Z.*

*.
FRZLVL...RANGING FROM SFC-140 ACRS AREA*

*MULT FRZLVL BLW 090 BOUNDED BY 150ESE ACK-200SE ACK-160SE SIE-
50S ECG-40SSE ILM-30SSE IRQ-40ENE ATL-GQO-20SSW VXV-HMV-
40W BKW-40SW CSN-60SE CYN-150ESE ACK
SFC ALG 20WSW HNV-20SE GSO-RDU-60SSW RIC
040 ALG 40ESE ORF-30NNW ILM-FLO-40SSW SPA-20WNW ODF-20S GQO
080 ALG LGC-20S ATL-20NW CHS-50S ILM-70SSE ECG-180E ECG
120 ALG 150SE LEV-170S CEW-30WSW OMN-100E CRG-210SSE ILM*

....

Figure 9 is a plot of AIRMET Sierra, which was current over the accident site for ceilings below 1,000 feet and visibility below 3 miles in precipitation and mist. The advisory was current before the flight's departure and was expected to continue beyond 2200 through 0400 EST.

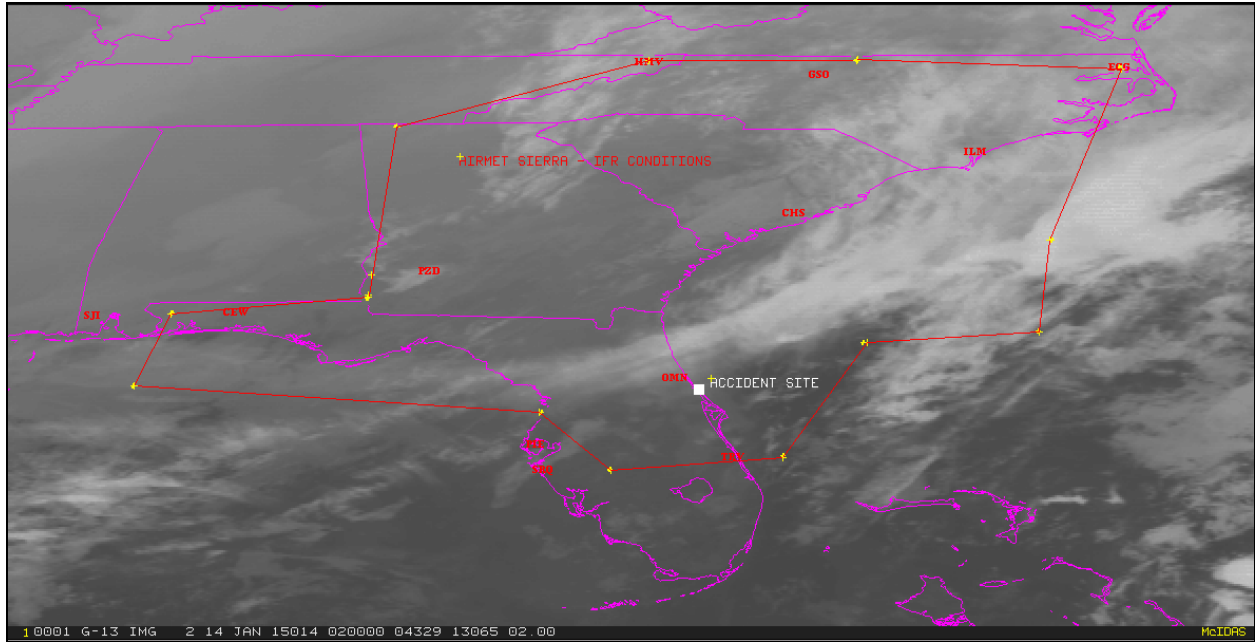


Figure 9 - Plot of AIRMET Sierra over the GOES-13 infrared satellite image at 2100 EST

The NWS AWC also issues graphic AIRMETs or G-AIRMETs on their web site (<http://aviationweather.gov/gairmet>). Figures 10-12 are the G-AIRMETs issued for IFR conditions at the initial time or for the existing conditions, and the 3-hour and 6-hour forecasts. The graphic images depicted IFR conditions over northern Florida at 1600 EST with the conditions spreading southward immediately north of the accident site at 1900 EST, and over the area by 2200 EST.

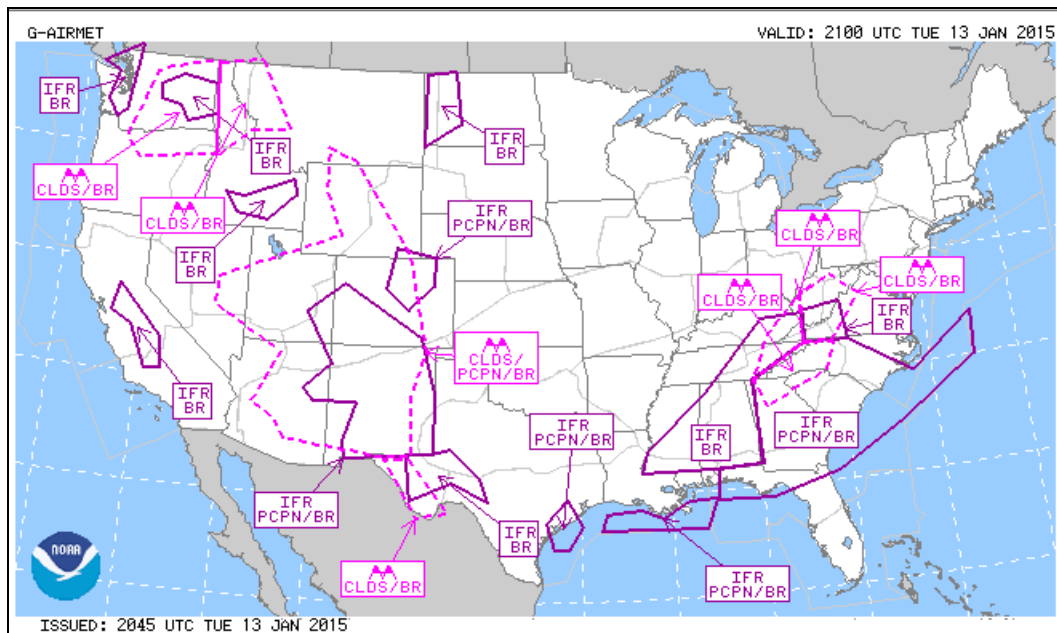


Figure 10 - NWS G-AIRMET initial conditions for 1600 EST

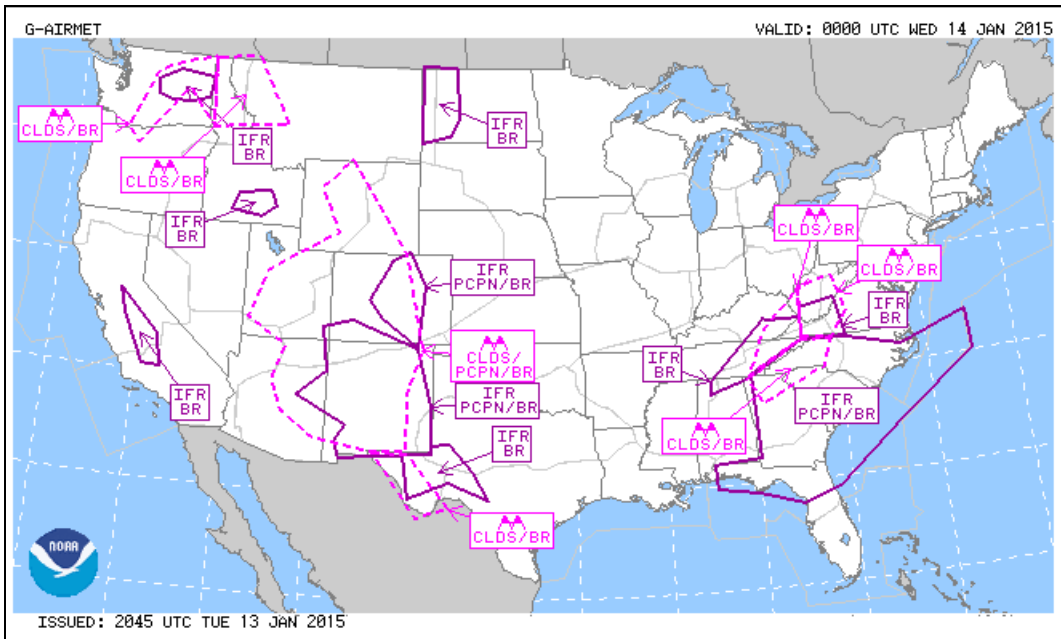


Figure 11 - NWS G-AIRMET 3-hour forecast valid for 1900 EST

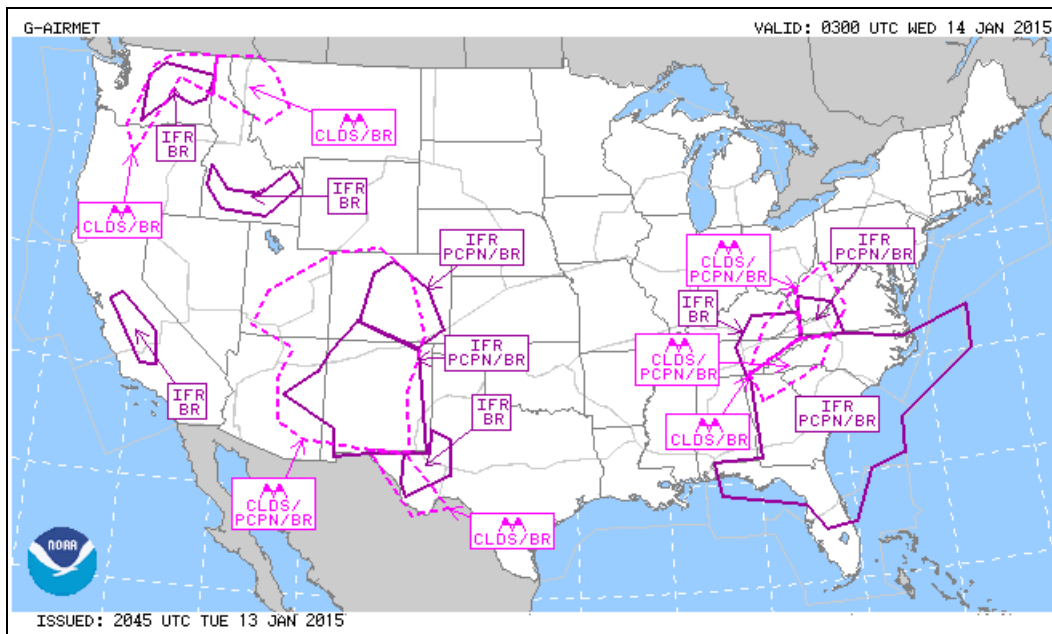


Figure 12 - NWS G-AIRMET 6-hour forecast valid for 2200 EST

The Jacksonville (KZJX) Center Weather Service Unit (CWSU) was responsible for the Daytona and New Smyrna Beach area airspace. The CWSU issued two advisories before the accident for patchy LIFR conditions over northern Florida, or for conditions mainly impacting the Jacksonville area. The advisories did not extend over the accident site and remained north of the area. The advisories were as follows:

*FAUS21 KZJX 132141
ZJX1 CWA 132145*

2015013 2142

ZJX CWA 107 VALID UNTIL 132345
FROM 35WNW SAV-15SE SAV-15SSE CRG-35E SZW-30WNW AMG-35WNW SAV
AREA PATCHY LIFR CIGS BLW 005 AND OCNL VIS BLW 2SM BR.
CONDS CONTG THRU PD.

FAUS21 KZJX 132322 2015013 2322
ZJX1 CWA 132325
ZJX CWA 108 VALID UNTIL 140125
FROM 40NW SAV-15SE SAV-35N OMN-25NE SZW-40NW SAV
AREA PATCHY LIFR CIGS BLW 005 AND OCNL VIS BLW 1SM BR/FG.
CONDS CONTG THRU PD.
=

11.0 Winds and Temperature Aloft Forecast

The NWS winds and temperature aloft forecast (FD) current during the period was as follows:

DATA BASED ON 131800Z
VALID 140000Z FOR USE 2000-0300Z. TEMPS NEG ABV 24000

FT	3000	6000	9000	12000	18000	24000	30000	34000	39000
MLB	0607	9900+12	2308+06	2613+01	2629-11	2545-22	276238	266048	264961

The winds aloft data for Melbourne for use between 1500 through 2200 EST provided the following information; at 3,000 feet wind from 060° at 7 knots, at 6,000 feet winds light and variable with a temperature of +12° C. The freezing level was identified at approximately 12,500 feet.

12.0 Model Data

Figure 13 is the NWS model output guidance (FOUS22 KWNO bulletin) available to the Melbourne NWS forecasters and pilots for the Daytona Beach area at 1300 EST on January 13, 2015. The model data provided a 3-hour forecast out through 60 hours for temperature, dew point temperature, total cloud cover, wind direction and speed, 6- and 12-hour probability of precipitation, precipitation amount, thunderstorm probability, conditional probability of freezing precipitation and snow, type of precipitation, snow amount, ceiling height categorical forecast for the hour, visibility categorical forecast for the hour, and obstruction to vision categorical forecast. The forecast guidance data indicated the following conditions surrounding the period:

1900 local (00Z) – temperature 66° F, dew point 62° F, overcast clouds, wind 010° at 5 knots, ceiling height between 2,000 and 3,000 feet agl, visibility greater than 6 miles, no obstructions to visibility.

2200 local (03Z) – temperature 65° F, dew point 62° F, overcast clouds, wind 350° at 4 knots, ceiling height between 1,000 and 1,900 feet agl, visibility greater than 6 miles, no obstructions to visibility.

0100 local (06Z) - temperature 65° F, dew point 61° F, overcast clouds, wind 350° at 4 knots, probability of precipitation 4%, ceiling height between 200 and 400 feet agl, visibility greater than 6 miles, no obstructions to visibility.

Based on the model data alone the forecast for MVFR conditions was expected until 2200 EST, with a rapid decrease to LIFR conditions expected by 0100 EST on January 14, 2015.

FOUS22 KWNO 131800													2015013 2159											
MAVSE1																								
KDAB	GFS MOS GUIDANCE												1/13/2015 1800 UTC											
DT /JAN	14												/JAN 15						/JAN 16					
HR	00	03	06	09	12	15	18	21	00	03	06	09	12	15	18	21	00	03	06	12	18			
N/X					61			72					52			69				47				
TMP	66	65	65	64	62	65	69	68	62	60	58	55	54	62	66	65	59	55	52	48	64			
DPT	62	62	61	59	58	60	58	56	56	54	52	50	50	53	52	51	50	49	48	44	43			
CLD	OV	OV	OV	OV	OV	OV	OV	BK	BK	BK	OV	OV	BK	BK	OV	OV	OV	OV	OV	FW	FW			
WDR	01	35	35	34	34	35	36	35	34	34	34	33	34	34	35	30	31	31	31	31	35			
WSP	05	04	04	06	09	10	12	11	08	07	04	06	04	04	08	09	05	05	08	07	09			
P06			4		5		5		0		4		7		5		18		15	24	3			
P12					25				11				7				20			34				
Q06			0		0		0		0		0		0		0		0		0	0	0			
Q12					0				0				0		0		0			1				
T06			1/	0	3/	0	1/	0	1/	2	1/	0	1/	3	0/	3	1/	4	2/	1	0/	2		
T12							3/	1			3/	2		1/	3			2/	4	2/	4			
POZ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
POS	0	0	0	0	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0			
TYP	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
SNW													0							0				
CIG	5	4	2	3	3	3	4	5	5	5	6	4	5	8	6	6	6	6	7	8	8			
VIS	7	7	7	7	7	7	7	7	7	7	7	6	6	7	7	7	7	7	7	7	7			
OBV	N	N	N	N	N	N	N	N	N	N	N	BR	BR	N	N	N	N	N	N	N	N			

Figure 13 – FOUS22 Guidance for Daytona Beach, FL at 1300 EST

Figure 14 is a depiction of the next updated model guidance issued at 1900 EST. That forecast expected at 0100 EST (06Z) LIFR conditions with overcast skies, with the ceiling between 200 and 400 feet agl, with visibility less than ½ mile in fog expected to prevail from 0100 through 1000 EST on January 14, 2015.

FOUS22 KWNO 140000												2015014 0359																												
MAVSE1																																								
KDAB GFS MOS GUIDANCE 1/14/2015 0000 UTC																																								
DT	/JAN 14						/JAN 15						/JAN 16																											
HR	06	09	12	15	18	21	00	03	06	09	12	15	18	21	00	03	06	09	12	18	00																			
X/N							69	53						70	47																									
TMP	66	65	64	67	68	65	61	60	58	56	55	62	67	66	59	55	53	50	48	63	56																			
DPT	59	59	58	60	59	57	56	54	53	51	51	54	53	52	51	50	49	47	44	44	45																			
CLD	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	SC	FW	CL																			
WDR	35	35	34	36	36	35	34	34	34	34	34	35	35	32	32	32	30	31	31	34	01																			
WSP	06	06	07	09	10	12	08	07	04	07	04	05	08	11	07	07	07	08	07	09	03																			
P06			16				5			9			6			6			31			27			14	5	2													
P12							21							8							31							46			6									
Q06							0							0							0							0							0			0		
Q12							0							0							0							0							1			0		
T06			5/	2			1/	0			1/	0			2/	0			2/	0			1/	3			2/	4			2/	2			2/	2			0/	0
T12							6/	2							4/	1							2/	3							2/	4			2/	4				
POZ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																		
POS	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0																		
TYP	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R																			
SNW													0							0							0			0										
CIG	2	1	2	2	4	5	4	3	4	3	3	4	5	6	6	6	5	7	8	8	8																			
VIS	1	1	1	2	7	7	7	7	7	7	6	7	7	7	7	7	7	7	7	7	7																			
OBV	FG	FG	FG	FG	N	N	N	N	N	N	N	HZ	N	N	N	N	N	N	N	N	N																			

Figure 14 - FOUS22 Guidance for Daytona Beach, FL at 1900 EST

13.0 Astronomical Data

The United States Naval Observatory website provided the following astronomical data for New Smyrna Beach, Volusia County, Florida on January 13, 2015:

- SUN
- Beginning of civil twilight 0653 EST
 - Sunrise 0718 EST
 - Sunset 1746 EST
 - End of civil twilight 1812 EST
 - Departure/Takeoff 1830 EST
 - Accident 2100 EST

- MOON
- Moonrise 0029 EST
 - Moonset 1212 EST

At the time of the accident both the sun and the moon were more than 15° below the horizon and provided no illumination over the area.

Submitted by:

Donald Eick
NTSB Senior Meteorologist

