



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

February 10, 2020

Weather Study

METEOROLOGY

ERA20FA060

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A. ACCIDENT

Location: College Park, Maryland
Date: December 29, 2019
Time: 1448 eastern standard time (1948 UTC)¹
Aircraft: Type - American Aviation AA5; Registration - N26455

B. METEOROLOGIST

Mike Richards
Senior Meteorologist
Operational Factors Division (AS-30)
National Transportation Safety Board

C. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's meteorological specialist did not travel in support of this accident investigation and gathered all weather data remotely. Unless otherwise noted, all times are in eastern standard time (EST) for December 29, 2019 (based upon the 24-hour clock), directions are referenced to true north, distances are in nautical miles and heights are above mean sea level (msl).

The accident site was located at: 38.97129° north latitude, 76.89316° west longitude, at an elevation of about 125 feet.

D. WEATHER INFORMATION

1.0 Surface Observations

An Automated Weather Observing System (AWOS) was located at College Park Airport (CGS²) in College Park, Maryland, which was located about 1.5 miles west-northwest of the accident location at an elevation of about 50 feet and had a magnetic variation of about 11° west. Automated longline³ reports from the CGS AWOS during the times surrounding the accident time are presented here.

¹ UTC – abbreviation for Coordinated Universal Time

² The National Weather Service uses the 4-digit International Civil Aviation Organization (ICAO) format for station identifiers (as seen in the body of some formatted weather observations). This report uses the 3-digit International Air Transport Association format for station identification, which does not use the geographic designating digit ("K" for stations in the continental U.S. and "P" for U.S. stations in Alaska and the Pacific region) as found in the ICAO format.

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.

[1348 EST] METAR KCGS 291848Z AUTO 10005KT 2 1/2SM OVC005 10/09 A3005
RMK AO1 T00970087=

[1408 EST] METAR KCGS 291908Z AUTO 09003KT 3SM OVC007 10/09 A3004
RMK AO1 T00980088=

[1428 EST] METAR KCGS 291928Z AUTO 09003KT 2 1/2SM OVC005 10/09 A3004
RMK AO1 T00980088=

**[1448 EST] METAR KCGS 291948Z AUTO 00000KT 2SM OVC005 10/09 A3003
RMK AO1 T01000090=**

[1508 EST] METAR KCGS 292008Z AUTO 08003KT 2SM OVC005 10/09 A3003
RMK AO1 T00970087=

[1528 EST] METAR KCGS 292028Z AUTO 00000KT 2 1/2SM OVC007 10/09 A3002
RMK AO1 T00970087=

At 1448 EST, the CGS AWOS reported a calm wind, visibility of 2 statute miles, ceiling overcast at 500 feet above ground level, temperature of 10° Celsius (C) and a dew point temperature of 9°C, altimeter setting of 30.03 inches of mercury; remarks: station without a precipitation discriminator, temperature of 10.0°C and a dew point temperature of 9.0°C.

An Automated Surface Observing System (ASOS) was located at Ronald Reagan Washington National Airport (DCA) in Washington, DC, which was located about 10 miles southwest of the accident location at an elevation of about 15 feet and had a magnetic variation of about 11° west. Automated longline reports from the DCA ASOS during the times surrounding the accident time are presented here.

[1352 EST] METAR KDCA 291852Z 06003KT 1/4SM R01/2400V4000FT -RA FG
OVC006 11/11 A3005 RMK AO2 SLP174 VIS 1V2 P0003 T01110106=

[1416 EST] SPECI KDCA 291916Z 00000KT 1 1/4SM R01/5000VP6000FT -RA BR
OVC006 11/11 A3004 RMK AO2 VIS 1/2V11/2 P0002 T01110111=

**[1452 EST] METAR KDCA 291952Z 12004KT 3/4SM R01/4000V4500FT -RA BR
OVC006 11/11 A3003 RMK AO2 SLP170 VIS 1/2V11/2 P0005
T01110111=**

[1457 EST] SPECI KDCA 291957Z 14004KT 1SM R01/4000V6000FT -RA BR
OVC006 11/11 A3003 RMK AO2 P0001 T01110111=

At 1452 EST, the DCA ASOS reported a wind from 120° at 4 knots, visibility of 3/4 of a statute mile, Runway 01 runway visual range of 4,000 feet variable 4,500 feet, light rain, mist, ceiling overcast at 600 feet agl, temperature of 11°C and a dew point temperature of 11°C, altimeter setting of 30.03 inches of mercury; remarks: station with a precipitation discriminator, sea level pressure of 1017.0 hectopascals (hPa), visibility variable between 1/2 a statute mile and 1 and 1/2 statute miles, 0.05 inches of liquid equivalent precipitation since 1352 EST, temperature of 11.1°C and a dew point temperature of 11.1°C.

2.0 Pilot Reports

Publicly disseminated pilot reports⁴ (PIREPs) made between 1300 and 1600 EST within about 20 miles of the accident location at or below 10,000 feet are presented here. Overcast clouds were reported between 500 and 800 feet. A Boeing 737 aircraft 10 miles south of Ronald Reagan Washington National Airport (DCA) at 2,500 feet reported a west wind of 30 knots.

BWI UA /OV BAL120004/TM 1805/FL036/TP B737/WX -RA/RM SMOOTH
DCA UA /OV BWI/TM 1818/FL100/TP E190/TB MOD CHOP 100
DCA UA /OV DCA190010/TM 1855/FL025/TP B738/WV 190030KT
ADW UA /OV ADW/TM 1900/FL030/TP B737/SK OVC006
DCA UA /OV DCA320003/TM 1923/FL004/TP E190/SK OVC004
BWI UA /OV BAL270025/TM 2001/FL008/TP P28A/SK OVC008/RM LNDG KGAI
DCA UA /OV DC A328004/TM 2040/FL020/TP B737/SK OVC005

3.0 Upper Air Data

A High-Resolution Rapid Refresh (HRRR) model⁵ sounding (figure 1) for the accident site at 1500 EST was retrieved from the National Oceanic and Atmospheric Administration's Air Resources Laboratory. Near the surface, the wind was from the east-southeast at about 5 knots and veered to a southwest wind of about 35 knots near 5,000 feet. Calculations made by the Rawinsonde Observation Program (RAOB) indicated the potential for moderate turbulence below 5,000 feet. A temperature inversion was noted between about 600 and 2,900 feet. The freezing level was at about 11,000 feet. The relative humidity was 97 percent or greater between the surface and about 13,000 feet. RAOB identified the potential for overcast cloud layers throughout these altitudes above about 350 feet.

⁴ These do not include pilot reports only broadcast via radio.

⁵ 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.

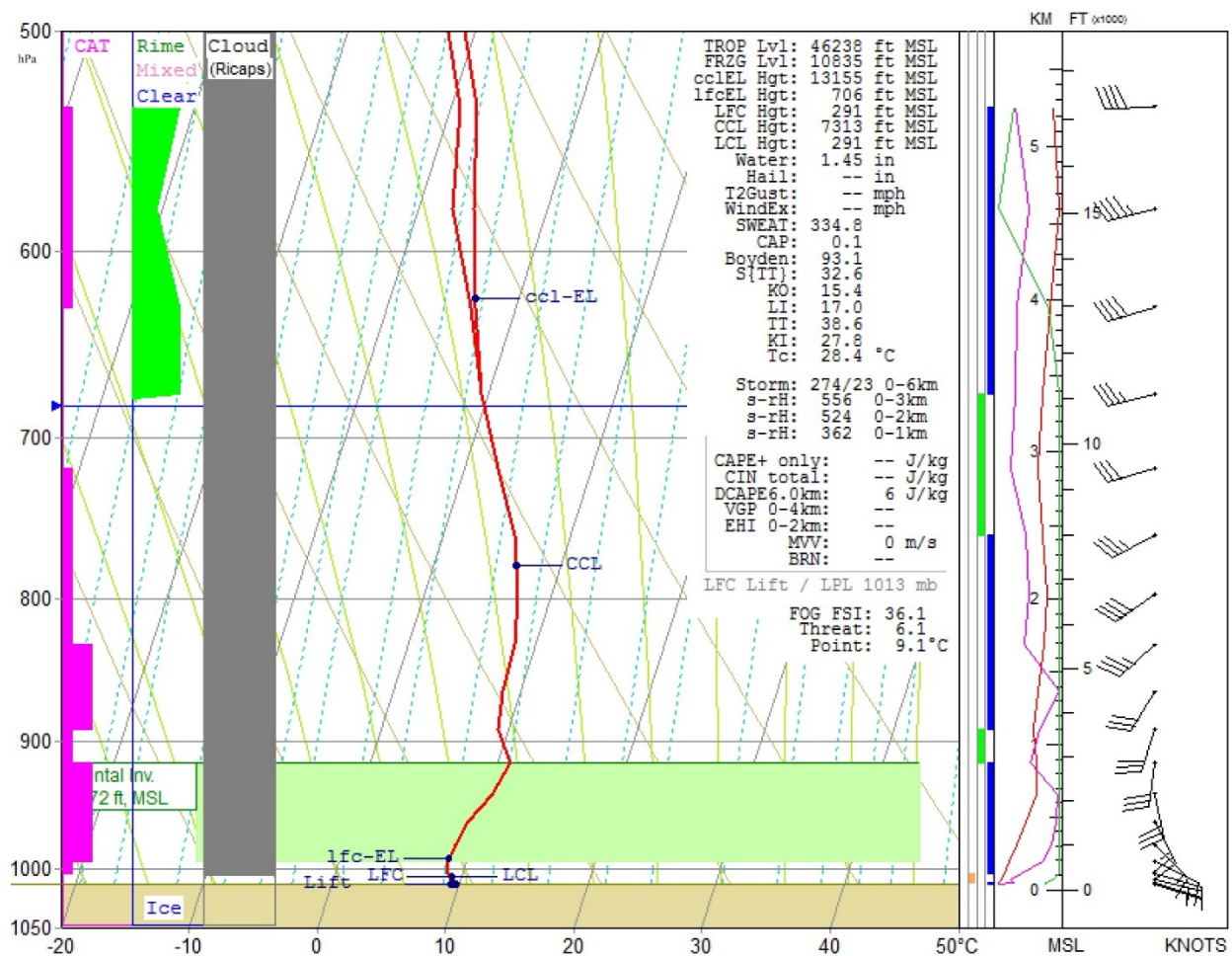


Figure 1 – HRRR model sounding data in SkewT/LogP format for 1500 EST at the accident site, surface to 500 hPa.

4.0 Satellite Imagery

Geostationary Operational Environmental Satellite (GOES)-16 infrared ($10.3\mu\text{m}$) data were obtained from an archive at the Space Science Engineering Center at the University of Wisconsin-Madison. Imagery from 1446 EST is presented in figure 2. Infrared cloud-top temperatures were about -15°C over the accident location at the accident time. Considering the HRRR sounding, this cloud top temperature corresponded to cloud top heights of about 21,000 feet.

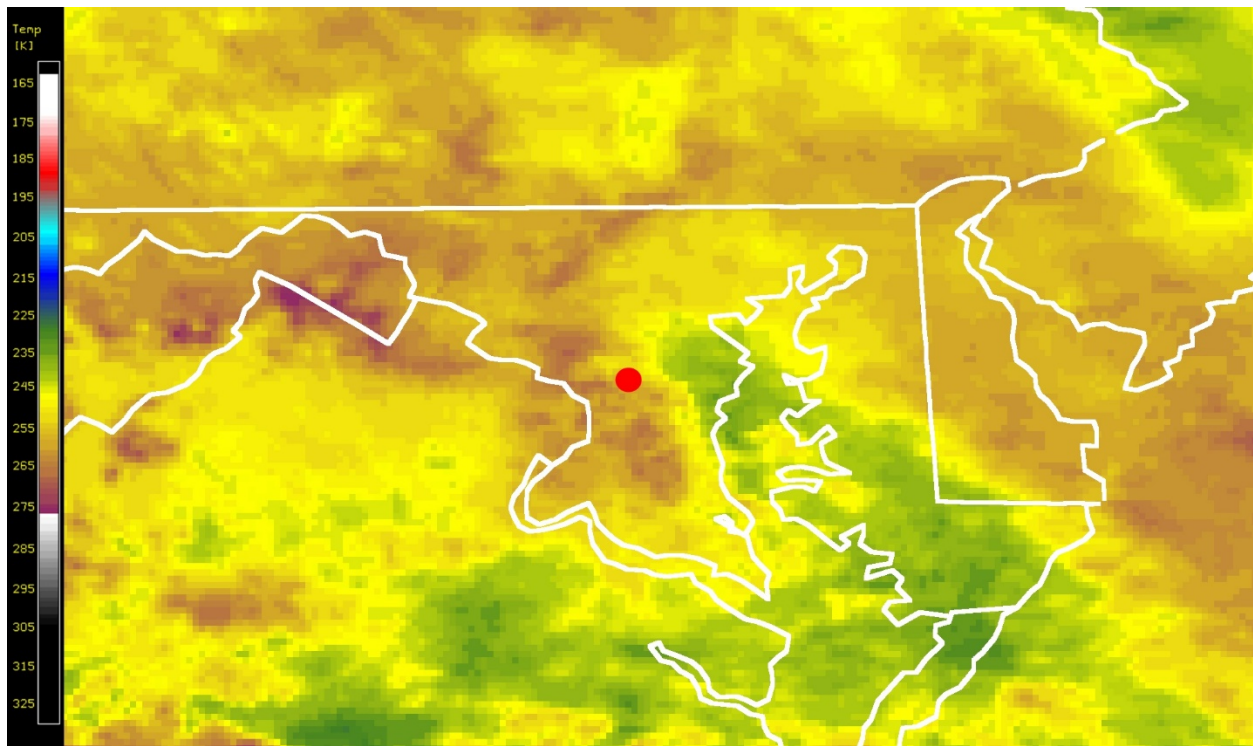


Figure 2 – GOES-16 infrared imagery (brightness temperature in degrees Kelvin) from 1446 EST. Accident location denoted by red dot. This image has not been corrected for any parallax error.

5.0 Weather Radar

WSR-88D Level-II weather radar imagery from Sterling, Virginia (KLWX), at about 1945 EST is presented in figure 3. KLWX was located approximately 27 miles west of the accident site with an antenna elevation of about 400 feet. Assuming standard refraction and considering the 0.95° beam width for the WSR-88D radar beam, the KDIX 0.439° tilt angle would have “seen” altitudes above the accident location of between about 800 and 3,500 feet above msl. Figure 3 depicts light values of reflectivity around the accident location at the accident time.

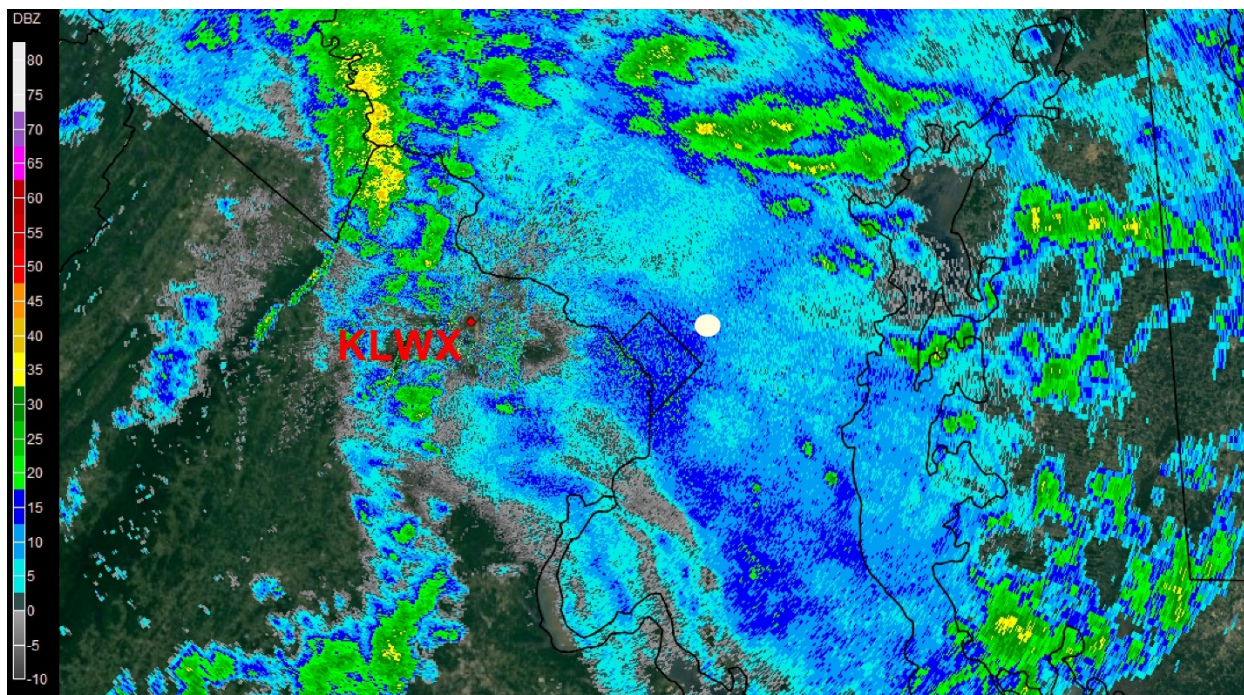


Figure 3 – KLWX WSR-88D Level-II 0.439° base reflectivity imagery from a sweep that began about 1445 EST.

6.0 Graphical Forecasts for Aviation

The Graphical Forecasts for Aviation (GFA) are intended to provide the necessary aviation weather information to give users a complete picture of the weather that might impact flight in the continental United States. Hourly model data and forecasts, including information on clouds, flight category, precipitation, icing, turbulence, wind, and other output from the National Weather Service (NWS) are available, however only certain imagery are archived by the NWS.

The following images (figures 4-7) depict GFA forecast information on sky condition, icing, mountain obscuration, instrument flight rule (IFR)⁶ condition and surface wind G-Airmen's Meteorological Information (G-AIRMET) advisories, surface visibility, surface wind, precipitation, and other obscurations and hazards, valid for the times surrounding the accident.

⁶ IFR conditions - Ceilings less than 1,000 feet agl and/or visibility less than three statute miles.

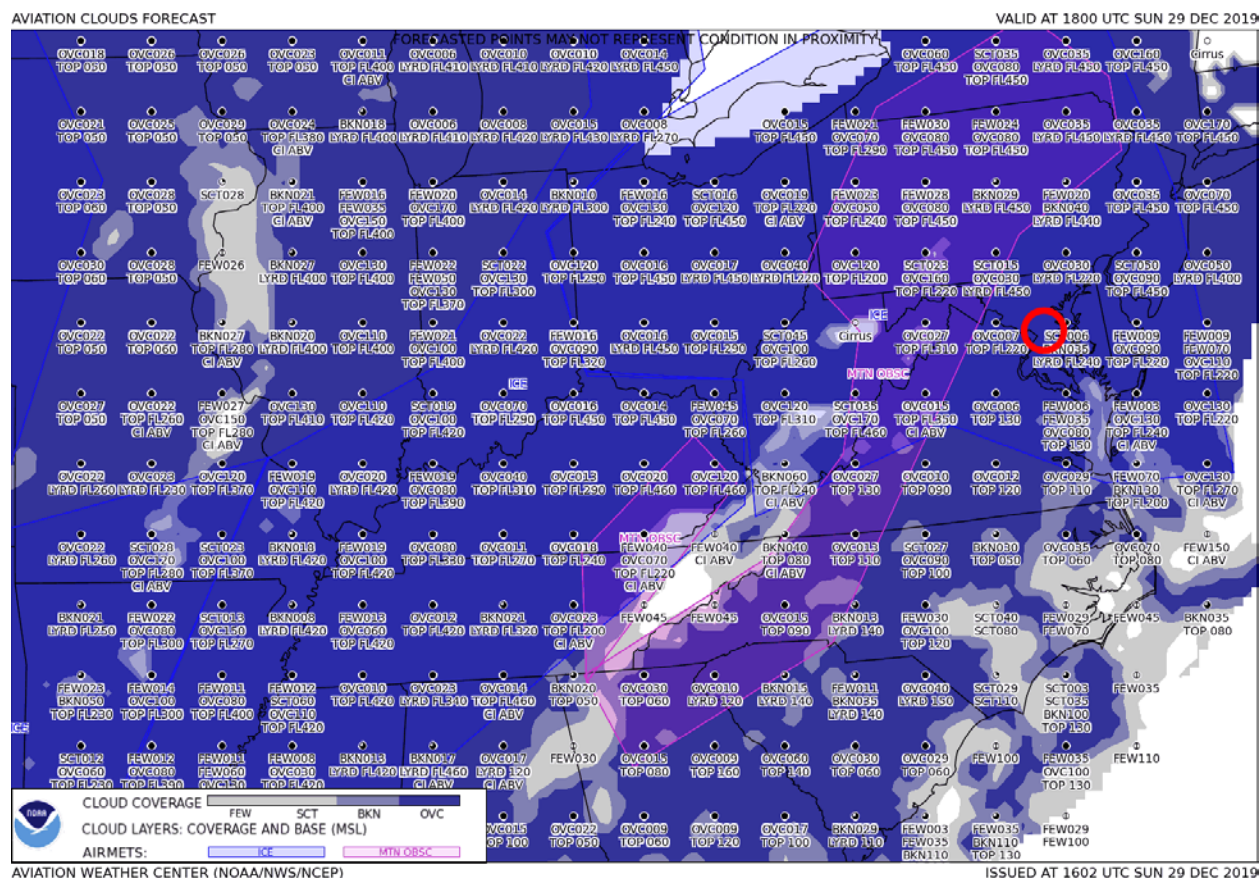


Figure 4 – GFA forecast imagery depicting sky condition and icing and mountain obscuration AIRMETs. Issued about 1100 EST and valid for 1300 EST. This GFA forecast imagery depicted overcast sky conditions over the accident region with cloud bases at 700 feet and cloud tops at FL220⁷ noted near the accident site. The accident location is located within the red circle.

⁷ Flight Level (FL) - 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 inches of mercury), the average sea-level pressure, and therefore is not necessarily the same as the aircraft's true altitude either above msl or agl.

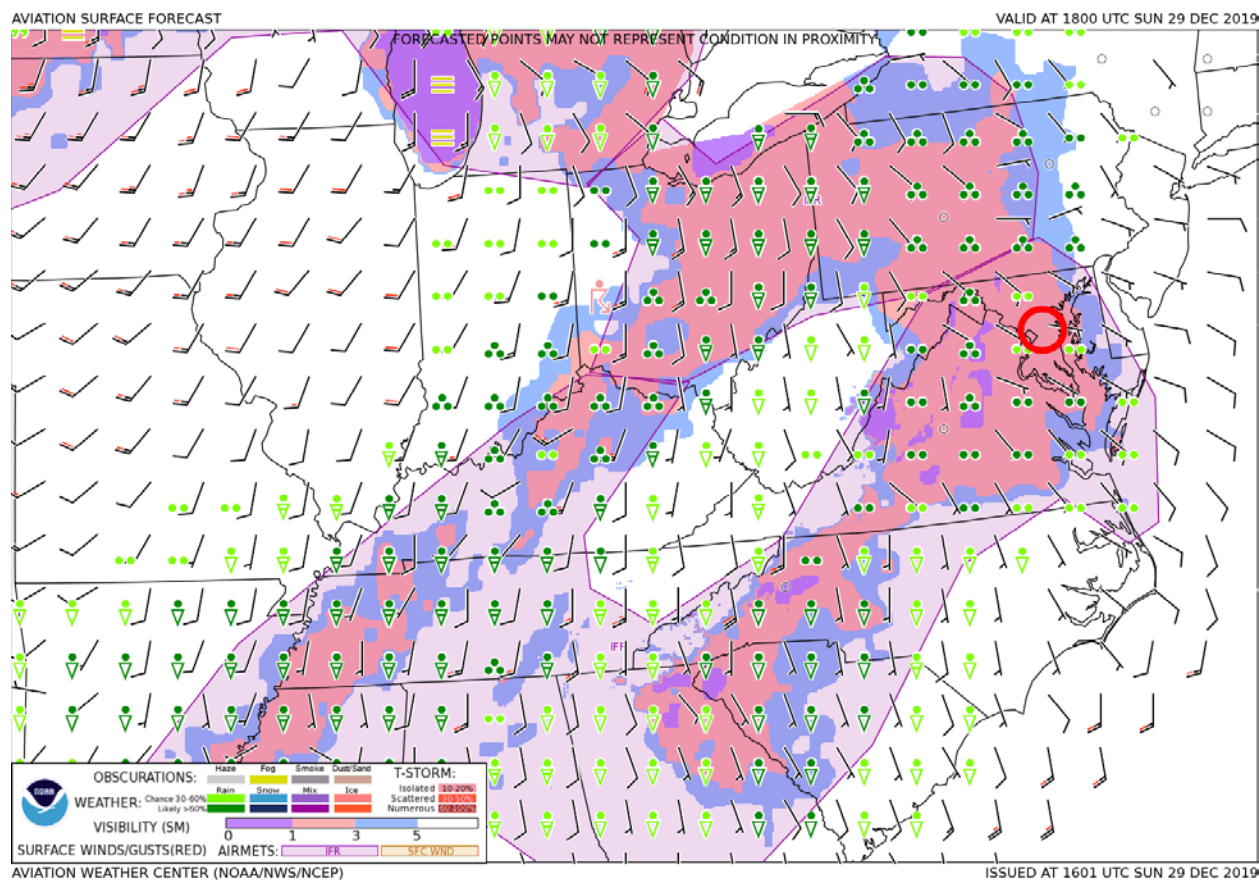


Figure 5 – GFA forecast imagery depicting IFR conditions and surface wind G-AIRMETs, surface visibility, surface wind, precipitation, and other obscurations and hazards. Issued about 1100 EST and valid for 1600 EST. This GFA forecast imagery depicted a surface visibility of between 1 to 3 statute miles at the accident location, a southeasterly surface wind of 5 knots and a thirty to sixty percent chance of light rain were identified near the accident location. A G-AIRMET for IFR conditions was active over the accident region. The accident location is located within the red circle.

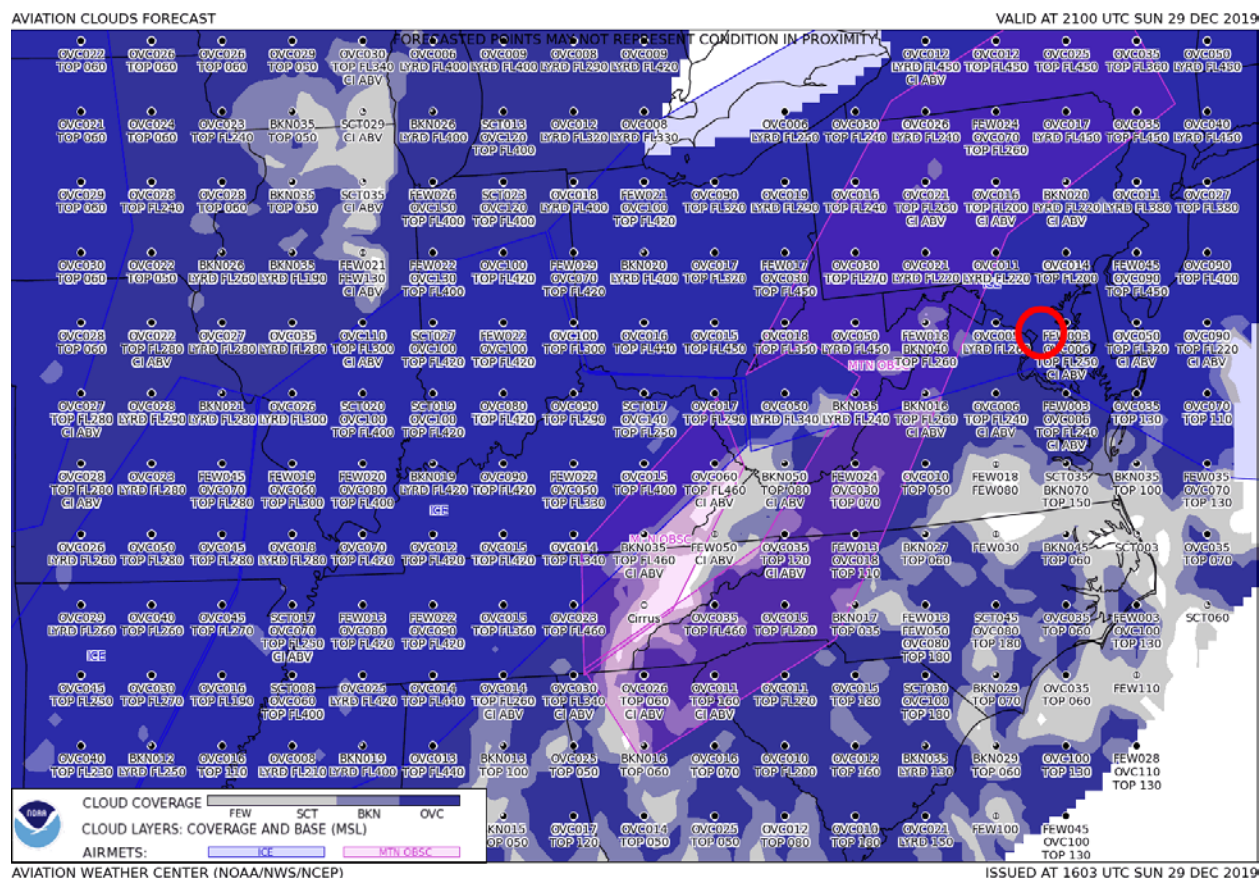


Figure 6 – GFA forecast imagery depicting sky condition and icing and mountain obscuration AIRMETS. Issued about 1100 EST and valid for 1600 EST. This GFA forecast imagery depicted overcast sky conditions over the accident region with cloud bases at 500 feet and cloud tops at FL260 noted near the accident site. The accident location is located within the red circle.

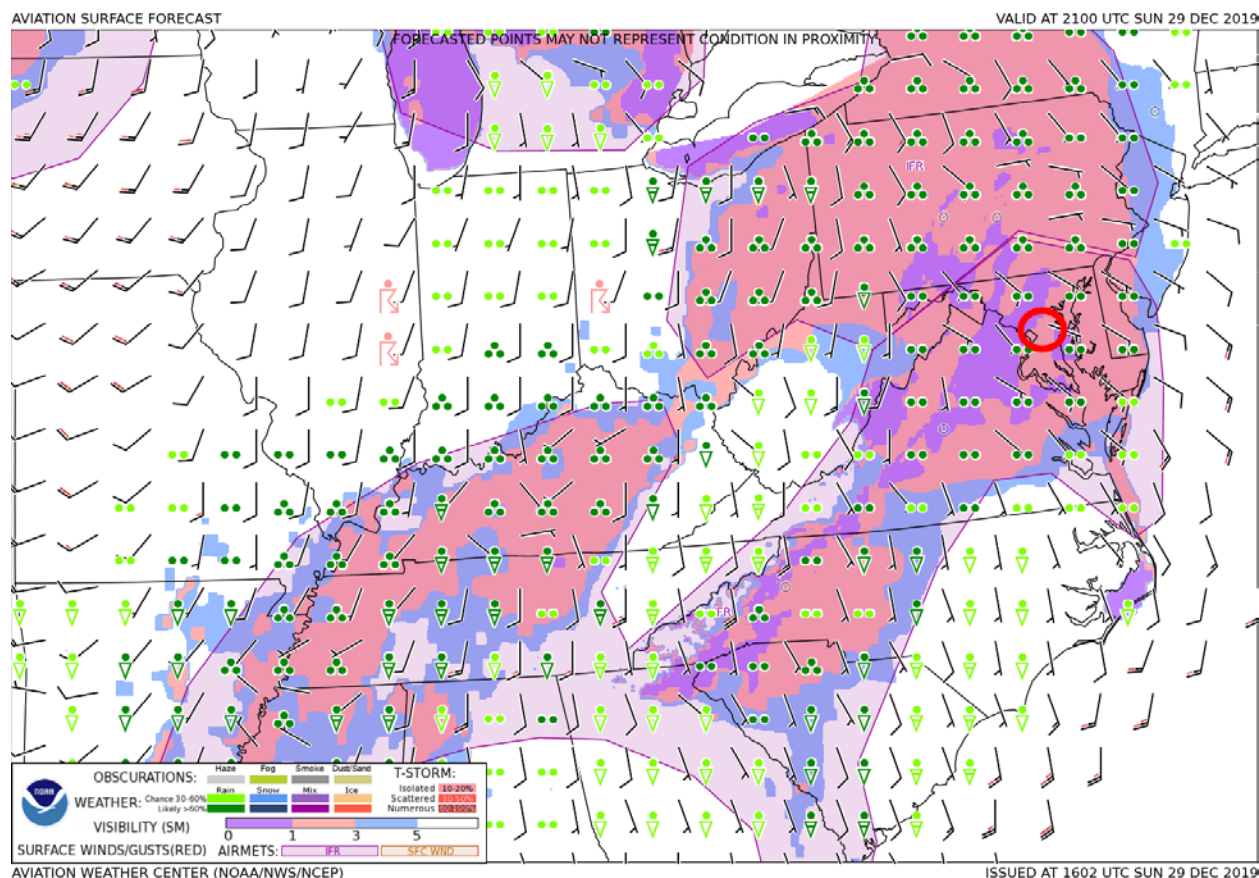


Figure 7 – GFA forecast imagery depicting IFR conditions and surface wind G-AIRMETs, surface visibility, surface wind, precipitation, and other obscurations and hazards. Issued about 1100 EST and valid for 1600 EST. This GFA forecast imagery depicted a surface visibility of between 1 to 3 statute miles at the accident location with 0 to 1 statute mile visibilities, a southeasterly surface wind of 5 knots and a sixty percent or greater chance of light rain identified near the accident location. A G-AIRMET for IFR conditions was active over the accident region. The accident location is located within the red circle.

7.0 AIRMETs

Several AIRMET advisories were issued by the NWS' Aviation Weather Center and active for the accident location at the accident time. AIRMETs for turbulence above FL180 and icing were not considered.

At 0945 EST, an AIRMET SIERRA was issued for IFR conditions in precipitation, mist and fog.

WAUS41 KPCI 291445

WA1S

-BOSS WA 291445

AIRMET SIERRA UPDT 5 FOR IFR AND MTN OBSCN VALID UNTIL 292100

AIRMET IFR...NJ PA OH WV MD DC DE VA NC SC GA FL AND CSTL WTRS
FROM HAR TO 30WSW CYN TO 50E ECG TO 30SSE ECG TO RDU TO 30ESE
CAE TO 20ESE ORL TO RSW TO 100SSW TLH TO 100SSE SJI TO 40W CEW TO
50SW PZD TO GQO TO 20SSW VXV TO 30E BKW TO 30N EKN TO HAR
CIG BLW 010/VIS BLW 3SM PCPN/BR/FG. CONDS CONTG BYD 21Z THRU
03Z.

At 0945 EST, an AIRMET TANGO was issued for moderate turbulence below 8,000 feet and expected low-level wind shear conditions.

WAUS41 KKCI 291445

WA1T

-BOST WA 291445

AIRMET TANGO UPDT 3 FOR TURB AND LLWS VALID UNTIL 292100

AIRMET TURB...NY LO PA OH LE WV MD DC VA NC SC GA FL AND CSTL
WTRS

FROM BUF TO 30S SYR TO 30SSW SBY TO CRG TO TLH TO 100SSE SJI TO 40W
CEW TO 50SW PZD TO GQO TO HMV TO HNN TO CVG TO FWA TO DXO TO
30NW CLE TO BUF

MOD TURB BLW 080. CONDS CONTG BYD 21Z THRU 03Z.

LLWS POTENTIAL...PA WV MD DC VA NC SC

BOUNDED BY 30ESE JST-30E DCA-40WSW ORF-30SW GSO-20SW CLT-30NNW
ODF-40NNW HMV-20N BKW-30ENE EKN-30ESE JST

LLWS EXP. CONDS CONTG BYD 21Z ENDG 00-03Z.

8.0 SIGMETs

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

9.0 CWSU

There were no Center Weather Advisories or Meteorological Impact Statements issued by the Center Weather Service Unit (CWSU) at the Washington Air Route Traffic Control Center that were active for the accident location at the accident time.

Submitted by:

Mike Richards
Senior Meteorologist

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