



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

December 5, 2017

Weather Study

METEOROLOGY

ERA17FA330

Table Of Contents

A.	ACCIDENT	3
B.	METEOROLOGIST	3
C.	SUMMARY	3
D.	DETAILS OF THE INVESTIGATION	3
E.	WEATHER INFORMATION	3
1.0	Synoptic Situation	3
1.1	Surface Analysis Chart	4
1.2	Weather Depiction Chart	5
1.3	12/24-Hour Low Level Significant Weather Prognostic Chart	6
2.0	Surface Observations	7
2.1	Fitzgerald, Georgia	7
2.2	METAR Display	8
3.0	Sounding	9
4.0	Satellite Imagery	11
5.0	Pilot Reports.....	13
6.0	Area Forecast	13
7.0	Inflight Weather Advisories.....	14
8.0	Astronomical Conditions	16

A. ACCIDENT

Location: Rhine, Georgia
Date: September 20, 2017
Time: 0605 eastern daylight time
1005 Universal Coordinated Time (UTC)
Airplane: Cessna 150G; registration: N3875J

B. METEOROLOGIST

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C. SUMMARY

On September 20, 2017, about 0605 eastern daylight time, a Cessna 150G, N3875J, was substantially damaged when it collided with terrain shortly after takeoff from a private airstrip near Rhine, Georgia. The student pilot, who was also the registered owner of the airplane was fatally injured. Night visual meteorological conditions prevailed for the personal flight conducted under the provisions of 14 *Code of Federal Regulations* Part 91. No flight plan was filed for the flight that was destined for Turner County Airport (75J), Ashburn, Georgia.

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 Center for Environmental Information (NCEI). All times are eastern daylight time (EDT) based upon the 24 hour clock, local time is +4 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.

The accident site was located at latitude 31°52'25" N and longitude 83°8'40" W, at an elevation of about 190 feet (ft).

E. WEATHER 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 Camp Springs, Maryland. These are the base products used in describing weather features and in the creation of forecasts and warnings. 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 Surface Analysis Chart

The southeast section of the NWS Surface Analysis Chart for 0500 EDT on September 20, 2017 is included as figure 1, with the approximate location of the accident site marked by the red star. The chart depicted a high-pressure system with a sea level pressure of 1016-hectopascals (hPa)¹ centered over eastern Tennessee and dominating over the region. No frontal boundaries were identified over the southeast at the time, and the isobars or lines of equal pressure indicated a weak pressure gradient over Georgia during the period.

The synoptic station models on the chart surrounding the accident site depicted calm to light southerly winds of 5 knots or less, clear skies, with numerous stations over western Georgia and eastern Alabama reporting mist and/or fog. The closest station model to the accident site on the chart was for Alma/Bacon County Airport (KAMG) located about 40 miles southeast, which reported a southerly wind of about 5 knots, clear skies, with a temperature of 74° Fahrenheit (F), with dew point temperature of 69° F.

¹ Hectopascal (hPa) is the new standard term for reporting pressure replacing millibar (mb) with the same units. Standard sea level pressure is 1013.25-hPa.

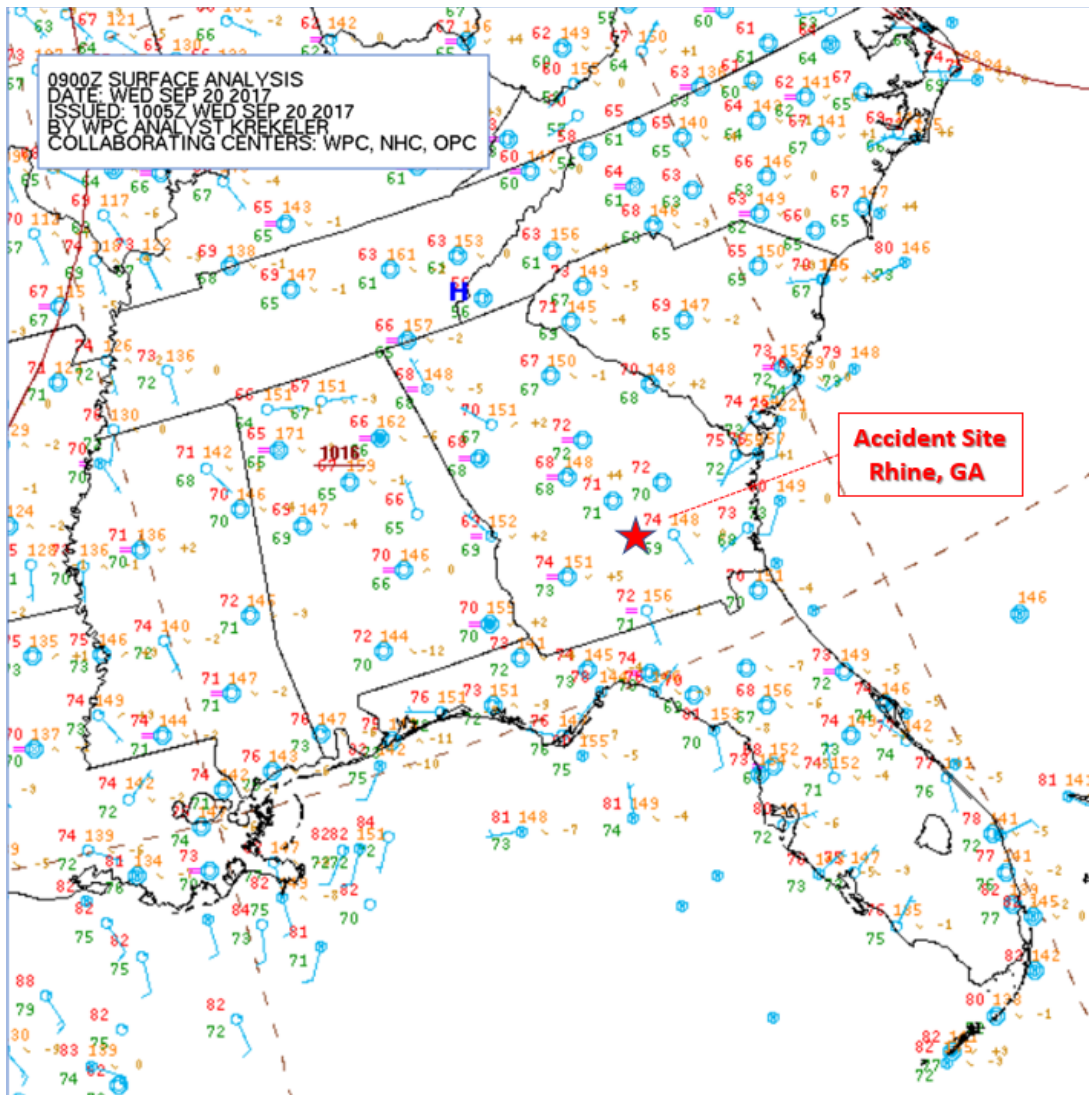


Figure 1 – Southeast section of the NWS Surface Analysis Chart for 0500 EDT

1.2 Weather Depiction Chart

The southeast section of the NWS Weather Depiction Chart for 0600 EDT is included as figure 2, with the approximate accident site marked by a red star. The chart depicts the general flight categories as defined by the NWS and the Federal Aviation Administration (FAA) Aeronautical Information Manual (AIM) section 7-1-7. The chart depicted a large area of instrument flight rule (IFR) conditions² over western Georgia and eastern Alabama by a shaded contour line. A larger area of marginal visual flight rule (MVFR) conditions³ surrounded the

² Instrument Flight Rule (IFR) conditions – are defined as a ceiling or the lowest layer of clouds reported as broken, overcast, or the vertical visibility into a surface based obscuration of less than 1,000 feet above ground level (agl) and/or visibility less than 3 statute miles.

³ Marginal Visual Flight Rules (MVFR) conditions – are defined as a ceiling between 1,000 feet to 3,000 feet inclusive and/or visibility between 3 to 5 miles inclusive.

IFR area over Georgia, northern Florida, Alabama, and eastern Tennessee, with another area of MVFR conditions over eastern Georgia and South Carolina, which bordered the accident site to the west. Visual flight rule (VFR) conditions⁴ were depicted over the southeast Georgia and the accident site.

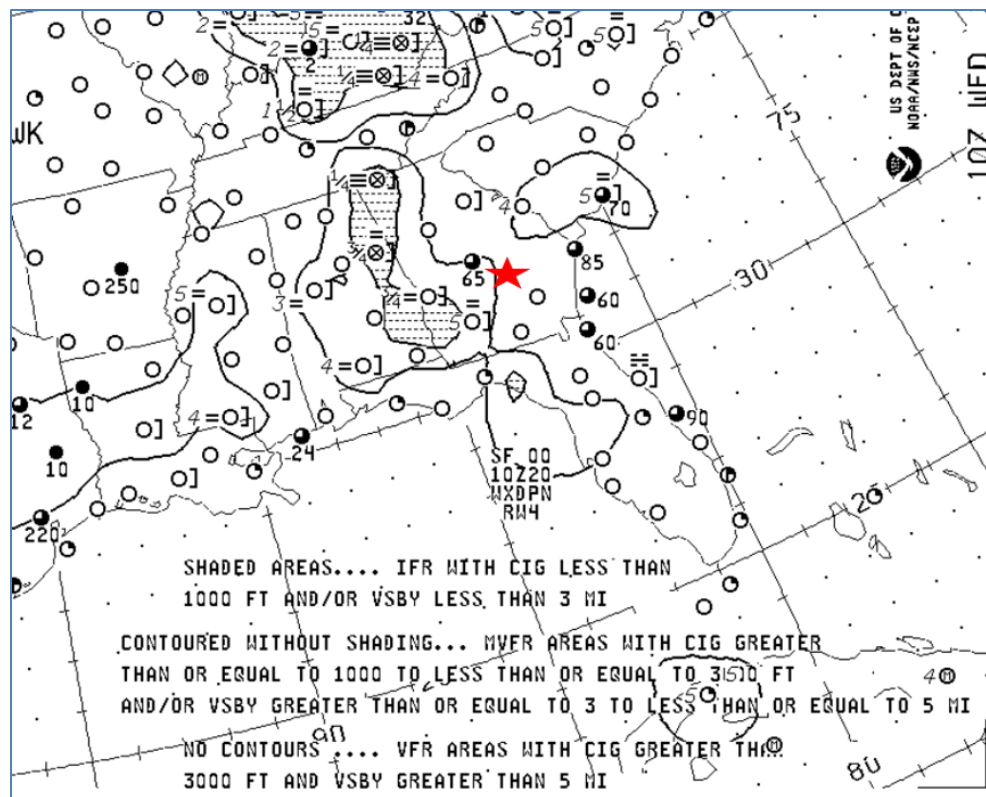


Figure 2 - Southeast section of the NWS Weather Depiction Chart for 0600 EDT

1.3 12/24-Hour Low Level Significant Weather Prognostic Chart

The 12-hour and 24-hour Low Level Significant Weather Prognostic Chart that was valid at the time of the accident is included as figure 3. The left chart is the 12-hour forecast valid at 1400 EDT (1800Z) and the right side the 24-hour forecast valid at 0200 EDT (0600Z) on September 21, 2017. The charts depicted VFR conditions over the southeast during the period, with the freezing level above 12,000 ft, and no significant low-level turbulence expected outside of convective clouds.

⁴ Visual Flight Rule (VFR) conditions – are defined as no ceiling or a ceiling above 3,000 feet agl and visibility greater than 5 miles.

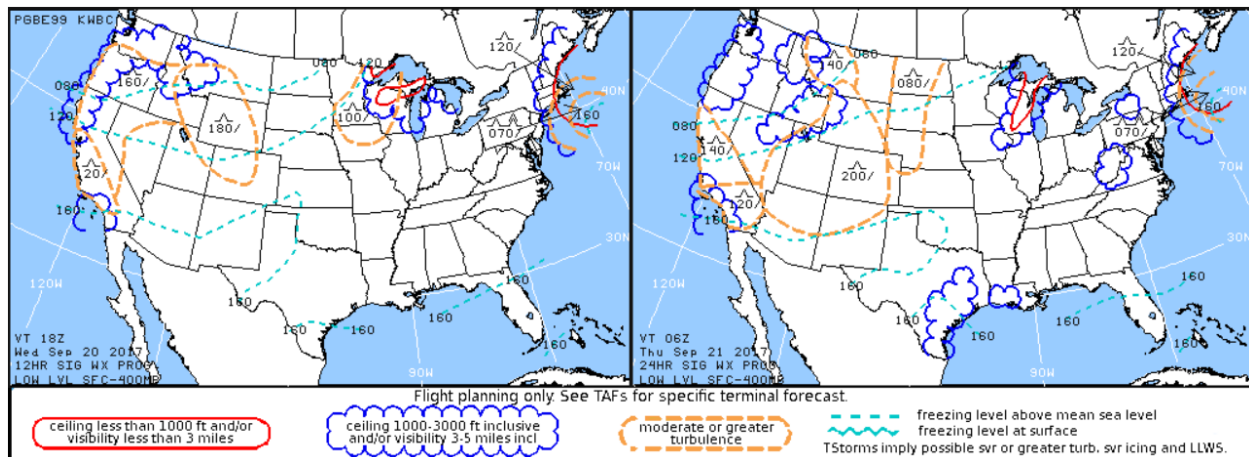


Figure 3 - 12/24-HR Low Level Significant Weather Prognostic Chart

2.0 Surface Observations

The area was documented utilizing the official NWS Meteorological Aerodrome Reports (METARs) and special reports (SPECI). Cloud heights are reported above ground level (agl) in the following section.

2.1 Fitzgerald, Georgia

The closest weather reporting facility to the accident site was from Fitzgerald Municipal Airport (KFZG), Fitzgerald, GA, located about 13 miles south-southwest of the accident site at an elevation of 365 ft. The airport had an Automated Weather Observation System (AWOS) and issued an observation every 20-minutes, and listed a magnetic variation of 3° West. The following conditions were reported at the time of the accident:

KFZG weather at 0555 EDT, automated observation, wind calm, visibility 4 miles in mist, sky clear below 12,000 ft agl, temperature and dew point temperature 22° Celsius (C), altimeter 30.01 inches of mercury. Remarks; automated weather observation system with a precipitation discriminator, temperature 21.9° C, dew point 21.9° C.

The same conditions were reported after the accident at 0615 EDT, with visibility decreasing below 3 miles after 0635 EDT or IFR conditions. The general flight categories and the raw observations reported between 0415 and 0855 EDT were as follows, the categories are color coded as blue for MVFR and red for IFR, with VFR black:

VFR METAR KFZG 200815Z AUTO 0000KT 7SM CLR 23/22 A2999 RMK AO2 T02250223=

MVFR METAR KFZG 200835Z AUTO 0000KT 4SM BR CLR 22/22 A3000 RMK AO2 T02200220=

MVFR METAR KFZG 200855Z AUTO 0000KT 5SM BR CLR 22/22 A3000 RMK AO2 T02200220=

MVFR METAR KFZG 200915Z AUTO 0000KT 5SM BR CLR 22/22 A3000 RMK AO2 T02180218=

MVFR METAR KFZG 200935Z AUTO 0000KT 4SM BR CLR 22/22 A3001 RMK AO2 T02160216=

MVFR METAR KFZG 200955Z AUTO 00000KT 4SM BR CLR 22/22 A3001 RMK AO2 T02190219=

Accident 1005Z

MVFR METAR KFZG 201015Z AUTO 00000KT 4SM BR CLR 22/22 A3001 RMK AO2 T02170217=

MVFR METAR KFZG 201035Z AUTO 00000KT 3SM BR CLR 22/22 A3002 RMK AO2 T02180218=

IFR METAR KFZG 201055Z AUTO 00000KT 2 1/2SM BR CLR 22/22 A3003 RMK AO2 T02150215=

IFR METAR KFZG 201115Z AUTO 00000KT 2SM BR CLR 22/22 A3003 RMK AO2 T02150215=

IFR METAR KFZG 201135Z AUTO 00000KT 1 1/4SM BR VV007 21/21 A3004 RMK AO2 T02140214=

IFR METAR KFZG 201155Z AUTO 00000KT 2SM BR CLR 22/22 A3005 RMK AO2 T02200220 10236 20211=

MVFR METAR KFZG 201215Z AUTO 00000KT 3SM BR CLR 23/23 A3005 RMK AO2 T02290229=

MVFR METAR KFZG 201235Z AUTO 00000KT 5SM BR CLR 24/24 A3006 RMK AO2 T02360236=

VFR METAR KFZG 201255Z AUTO 00000KT 7SM CLR 24/24 A3006 RMK AO2 T02430241=

The observations indicated MVFR conditions due to visibility restricted in mist occurring from 0435 EDT with temporary IFR conditions between 0655 through 0815 EDT, with MVFR conditions ending at 0855 EDT.

2.2 METAR Display

A display of the METAR observations over southern Georgia at 0630 EDT immediately after the accident obtained from the NWS Aviation Weather Center's (AWC) website (<http://aviationweather.gov/>) is included as figure 3. The image depicted several stations surrounding the accident site to the southwest, west, and north reported calm to light winds, clear skies, with visibility restricted from 4 to 5 miles in mist, with temperature and dew point temperature depressions of 1° F or less. While stations to the east and southeast generally had slightly larger temperature-dew point spreads.

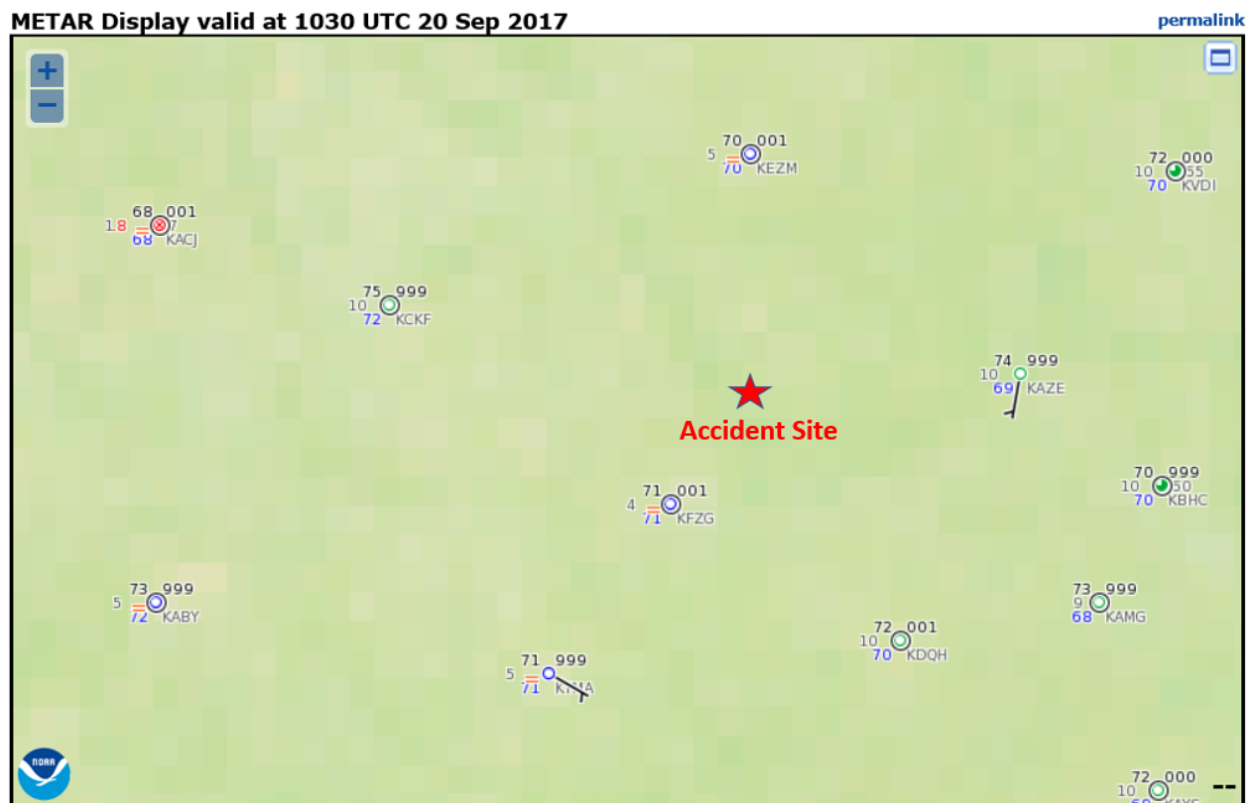


Figure 4 - METAR display at 0630 EDT over southern Georgia

3.0 Sounding

A High Resolution Rapid Refresh (HRRR) numerical model was obtained from archive data from the NOAA Air Resource Laboratory database for the approximate location of the accident at 0600 EDT (1000Z) and is included as figure 5. The model sounding was plotted on a standard Skew-T log P diagram⁵ from the surface to 500-hPa or 18,000 ft using RAOB software⁶, with the elevation of the area estimated at 233 ft.

⁵ Skew T log P diagram – is a standard meteorological plot or thermodynamic diagram 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.

⁶ RAOB software – The complete Rawinsonde Observation program is an interactive sounding analysis program developed by Environmental Research Services, Matamoras, Pennsylvania.

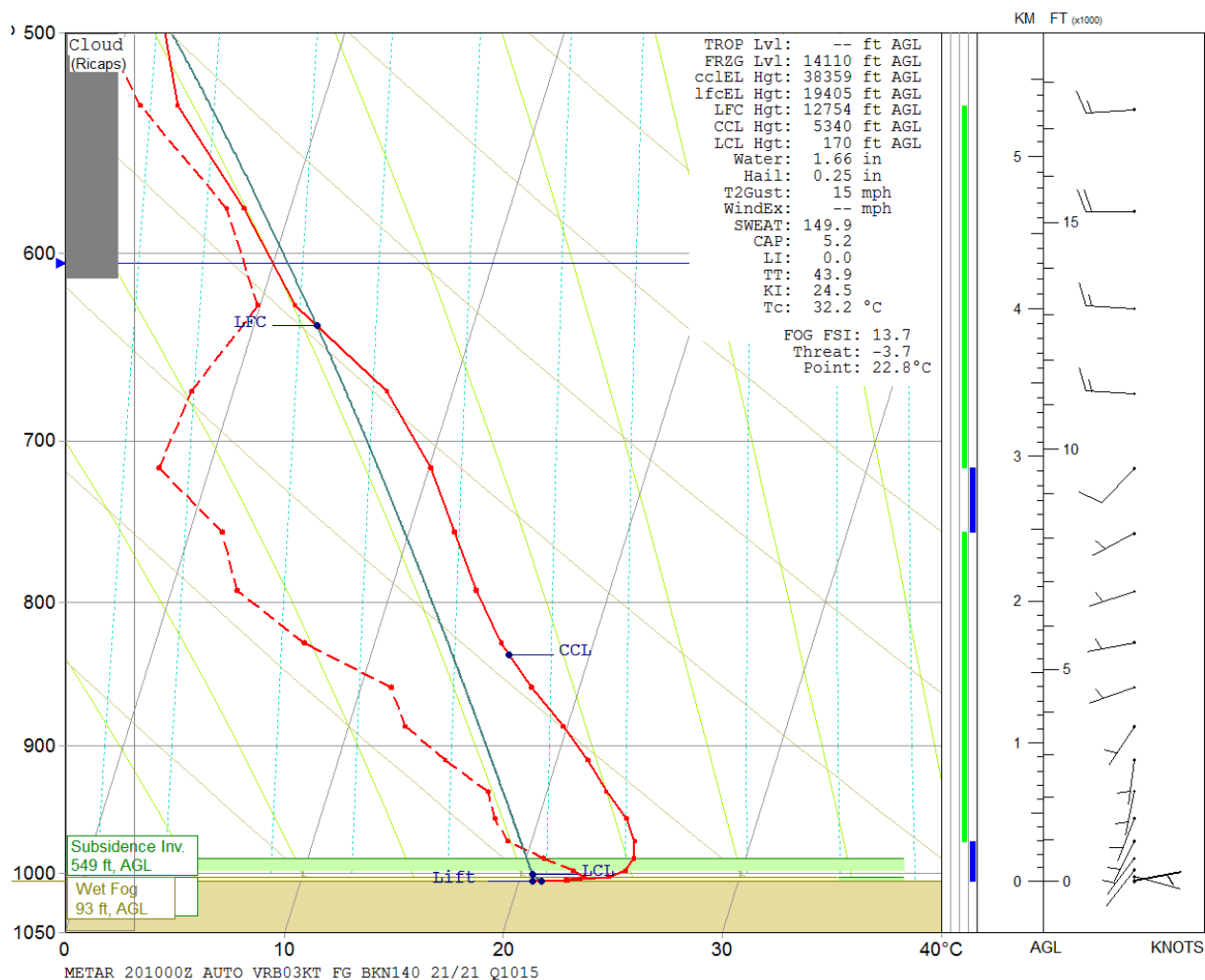


Figure 5 - HRRR Model sounding for 0600 EDT over the accident site

The model sounding predicted a surface temperature of 21.0° C, a dewpoint temperature of 20.6° C, with a relative humidity of 98%, and a density altitude calculated as 1,223 ft. The sounding depicted a surface based temperature inversion to about 550 ft agl and supported radiation type fog formation at the surface. The fog point or formation temperature for fog was 22.8° C, with the Fog Stability Index (FSI) of 13.7 and the fog threat index of -3.7 indicated a high threat of radiation type fog, with the fog layer from the surface to 93 ft agl. The precipitable water content was 1.66 inches. The lifted condensation level (LCL) was identified at 170 ft agl, with the convective condensation level (CCL) at 5,340 ft agl, and the level of free convection (LFC) at about 12,900 ft. The freezing level was identified at about 14,300 ft.

The wind profile depicted a light and variable surface wind of 3 knots, with wind from south above the temperature inversion and veering to the west with height through 10,000 ft at 10 knots or less. The mean 0 to 6 kilometer or about 18,000 ft wind was from 260° at 10 knots. There were no strong vertical wind shears identified below 3,000 ft to suggest any potential turbulence. Figure 6 is a table of the derived model data through 10,000 ft.

Height (ft-MSL)	Pres (mb)	T (C)	Td (C)	RH (%)	DD / FF (deg / kts)	CAT (FAA)	LLWS
233	1007	21.0	20.6	98	78 / 3		
261	1006	22.2	22.1	99	78 / 3		LIGHT
347	1003	24.0	22.9	94	106 / 1		LIGHT
491	998	24.7	22.3	87	216 / 1		
782	988	24.9	20.8	78	215 / 3		
1194	974	24.7	18.9	70	205 / 5		
1732	956	24.0	18.0	69	200 / 5		
2370	935	22.7	17.3	72	190 / 5		
3113	911	21.4	14.9	66	187 / 4		
3904	886	19.8	12.6	63	212 / 5	LGT	
4810	858	17.8	11.4	66	249 / 6		
5841	827	15.8	6.8	55	258 / 4		
7043	792	13.9	3.0	48	250 / 3		
8363	755	12.1	1.5	48	240 / 6		
9816	716	10.1	-2.3	42	222 / 8	MDT	

Figure 6 - HRRR Model parameters to 10,000 ft

A review of the sounding temperature and moisture profile also indicated a moderate threat of carburetor type icing from the surface through 8,000 ft. A Carburetor Icing plotting chart is included as figure 7.

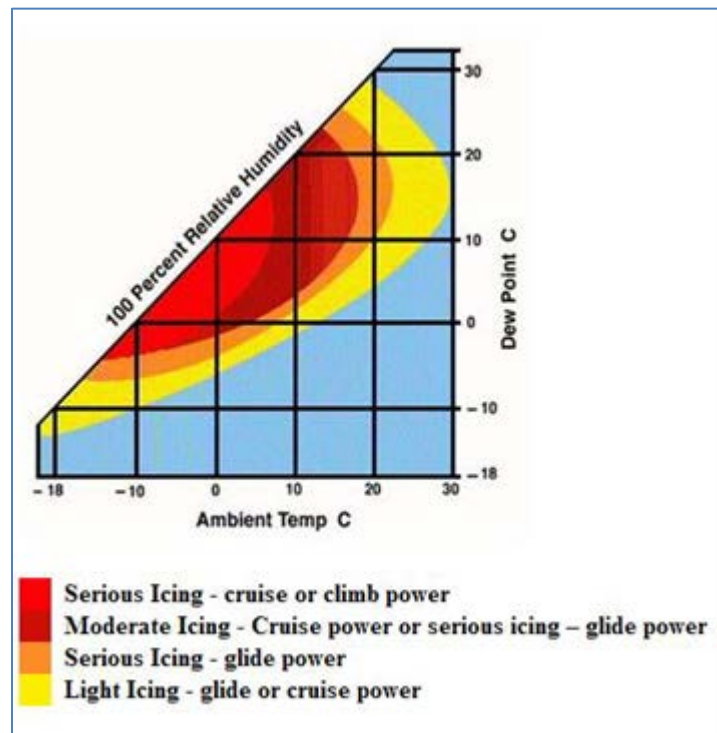


Figure 7 - Carburetor Icing Threat

4.0 Satellite Imagery

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 in Madison, Wisconsin, and processed using the Man-computer Interactive Data Access System (McIDAS) software. Both the infrared long wave and visible band imagery

were obtained surrounding the time of the accident. The infrared long wave imagery (band 4) at a wavelength of 10.7 microns (μm) provided standard satellite image with radiative cloud top temperatures with a resolution of 4 km. The visible imagery (band 1) at a wavelength of 0.65 μm provided a resolution of 1 km; however, due to the time of the day the visible imagery was not available until after the time of the accident.

Figure 8 is the GOES-13 infrared image at 4X magnification for 0615 EDT with the accident site marked by the red square. The image depicted clear skies over the accident site with a mid level band of clouds near 14,000 ft to the northeast and east. The image could not discriminate between any low mist or fog and the surface temperatures at the time of the image.

Figure 9 is the GOES-13 visible image at 0745 EDT after the accident. No significant features were identified over the region, and no defined thick areas of fog and mist, or low stratiform type clouds were identified over the accident site at this time.

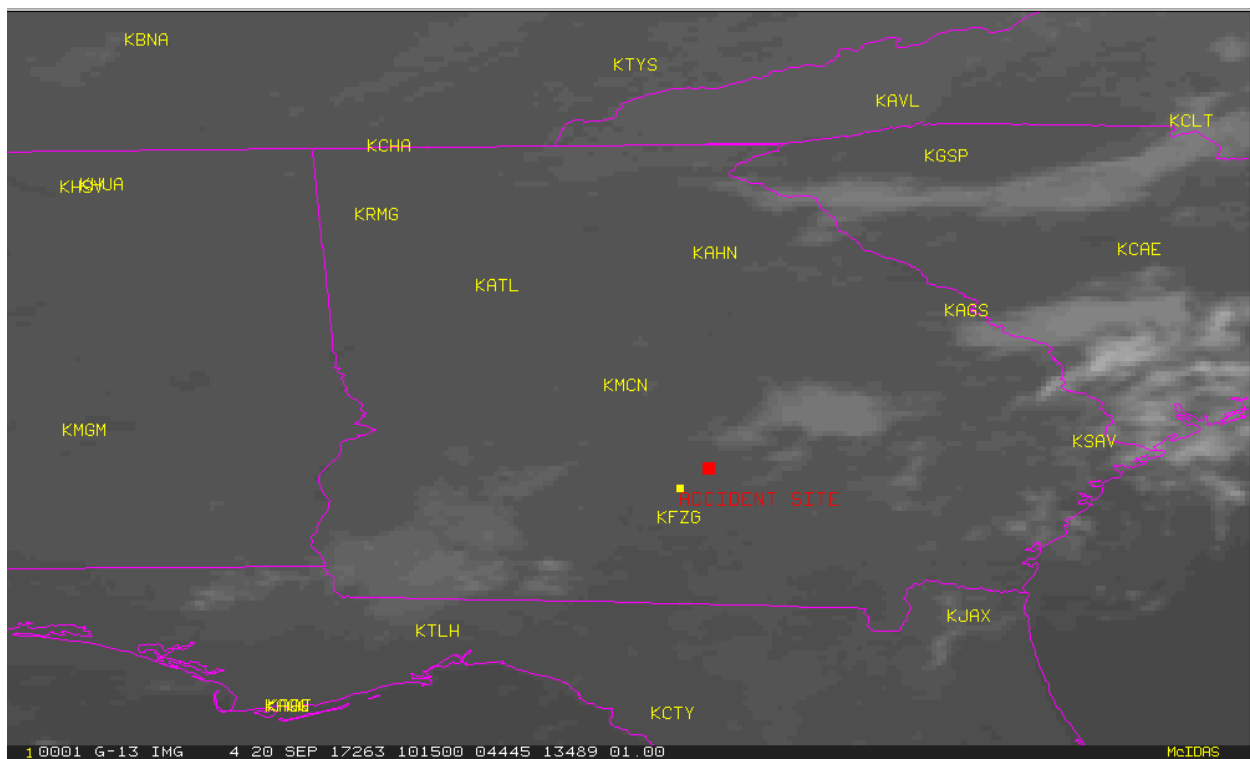


Figure 8 - GOES-13 Infrared Image at 0615 EDT

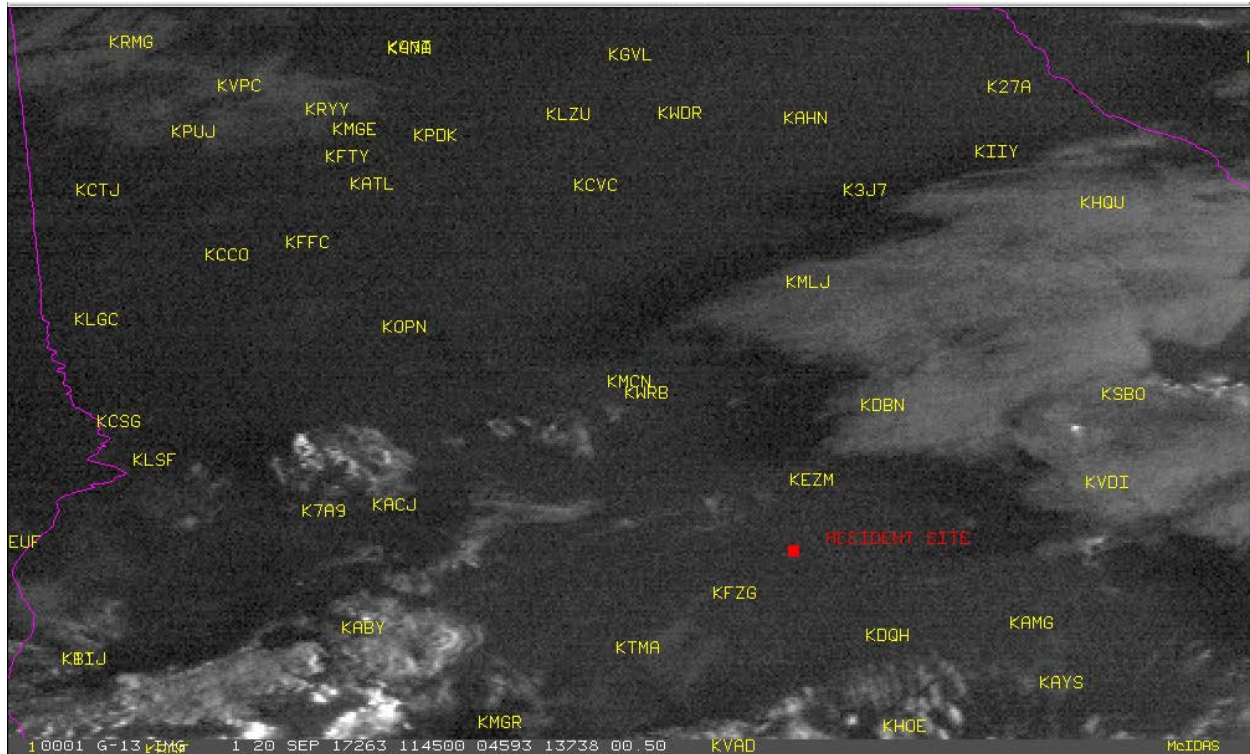


Figure 9 - GOES-13 Visible Image at 0745 EDT

5.0 Pilot Reports

A search of the NWS database revealed no pilot reports within 100 miles of the accident site below 15,000 ft from 0300 through 1000 EDT on September 20, 2017.

6.0 Area Forecast

The Area Forecast (FA) that was current for the area and provided the route forecast was as follows:

FAUS42 KPCI 200845
 FA2W
 -MIAC FA 200845
 SYNOPSIS AND VFR CLDS/WX
 SYNOPSIS VALID UNTIL 210300
 CLDS/WX VALID UNTIL 202100...OTLK VALID 202100-210300
 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...09Z RDG AXIS SRN APLCNS AND SFC TROF CNTRL-SRN FL. 00Z
 WEAK PRES GRADIENT THRUT WITH SFC TROF SC-NRN FL.
 .
 GA

NRN...SCT020 SCT080. VIS 3-5SM BR. 14Z SCT060. 20Z SCT-BKN050 TOP 080. ISOL -SHRA.
 OTLK...VFR TIL 23Z SHRA.
SRN...SCT050 SCT-BKN CI. NRN PTN OCNL VIS 5SM BR. 14Z SCT050 SCT CI. 19Z BKN040 TOP 080. SCT -SHRA/ISOL -TSRA. CB TOP FL350. OTLK...VFR TIL 01Z TSRA/SHRA.
 .
 SC
 APLCNS...BKN090 TOP 130. OCNL VIS 5SM BR. 13Z SCT070. 18Z SCT-BKN050 TOP 090.
 ISOL -SHRA/-TSRA. CB TOP FL350. OTLK...VFR TIL 00Z TSRA/SHRA.
 PIEDMONT...SCT060 SCT CI. 19Z SCT-BKN060 TOP 120. SCT -SHRA/ISOL -TSRA. CB TOP FL350.
 OTLK...VFR TIL 00Z TSRA/SHRA.
 CSTL PLN...SCT CI. OCNL VIS 5SM BR. 14Z SCT040. 19Z SCT-BKN050 TOP 100. ISOL -SHRA/-TSRA.
 CB TOP FL350. OTLK...VFR TIL 01Z TSRA/SHRA.

The forecast for southern Georgia expected scattered clouds at 5,000 ft with scattered to broken high cirriform clouds over the region, with occasional visibility of 5 miles in mist across the northern portion. After 1000 EDT, scattered clouds at 5,000 ft with scattered high cirrus clouds and visibility unrestricted.

7.0 Inflight Weather Advisories

There were no significant meteorological advisories (SIGMETs), Convective SIGMETs, Center Weather Advisories (CWA), airmen's meteorological advisories (AIRMETs), or Severe Weather Forecast Alerts (AWW) current over southern Georgia or in the vicinity of the accident site during the period.

The Atlanta Center Weather Service Unit (CWSU) did issue a CWA for northwest Georgia, Alabama. And Tennessee for an area of LIFR conditions due to low ceilings and visibility in fog. The area did not extend over the accident site or impact the proposed route of flight. That advisory was as follows:

*FAUS21 KZTL 201005
 ZTL1 CWA 201005
 ZTL CWA 101 VALID UNTIL 201205
 FROM 30N HMV-35SE MGM-35W VUZ-60E BNA-30N HMV
 AREA PATCHY LIFR CIGS BLW 005 AND VIS BLW 1SM IN FG. EXP CONDS TO
 CONT BYD END OF PD.*

The advisory was updated at 0800 EDT (1200Z) and continued through 1000 EDT (1400Z) with the same coordinates.

While no AIRMET were current for southern Georgia or over the accident site, an AIRMET was issued for portions of Alabama and Tennessee, due to IFR and mountain obscuration conditions. The text of the AIRMETs issued during the period follow below, along with the graphic or G-AIRMETs at 0500 (0900Z) and 0800 EDT (1200Z) respectively in figures 10 and 11.

WAUS42 KPCI 200845
 WA2S
 -MIAS WA 200845
 AIRMET SIERRA UPDT 1 FOR IFR VALID UNTIL 201500

NO SGFNT IFR EXP OUTSIDE OF CNVTV ACT.

WAUS43 KPCI 200845
 WA3S
 -CHIS WA 200845
 AIRMET SIERRA UPDT 1 FOR IFR AND MTN OBSCN VALID UNTIL 201500
 AIRMET IFR...IN KY TN AL
 FROM CVG TO HNN TO HNV TO GQO TO 50SW PZD TO 20W CEW TO 30ENE PXV TO CVG
 VIS BLW 3SM BR/FG. CONDS ENDG 12-15Z.

SIERRA 2017-09-20 09:00:00

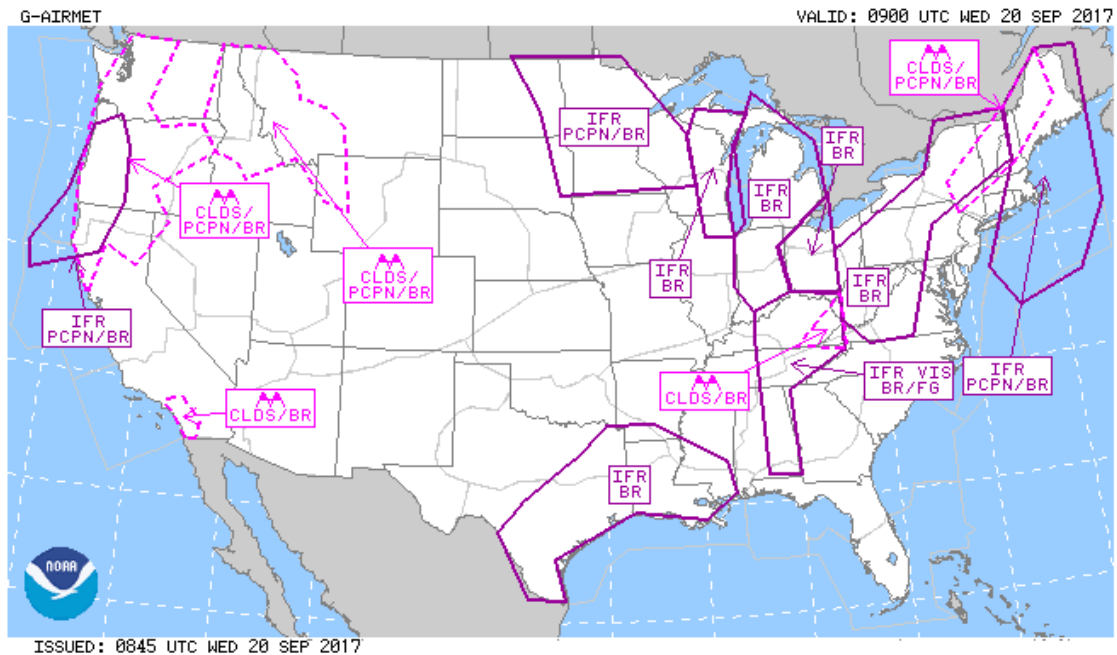


Figure 10 - G-AIRMET Sierra for IFR and Mountain Obscuration Conditions at 0500 EDT

SIERRA 2017-09-20 12:00:00

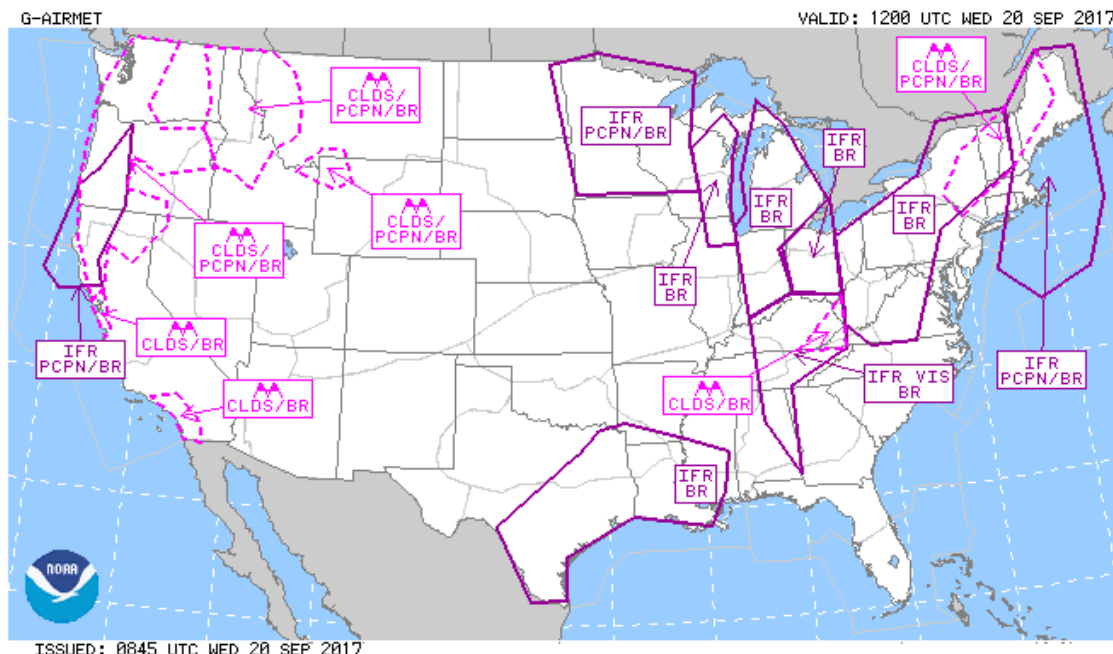


Figure 11 - G-AIRMET Sierra for IFR and Mountain Obscuration Conditions at 0800 EDT

8.0 Astronomical Conditions

The United States Naval Observatory website (<http://www.usno.navy.mil/>) was used to determine the astronomical conditions on September 20, 2017 for Rhine, Dodge County, GA, which were as follows:

Accident	0605 EDT
Begin civil twilight	0656 EDT
Sunrise	0720 EDT
Moonrise	0737 EDT
Sun transit	1326 EDT
Sunset	1932 EDT
End civil twilight	1956 EDT
Moonset	2007 EDT

At the time of the accident the Sun and the Moon were both more than 15° below the horizon and provided no illumination. Therefore, dark nighttime conditions existed at the time of the accident.

Submitted by:_____

Don Eick
Senior Meteorologist