



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

August 24, 2022

Specialist's Factual Report

METEOROLOGY

HWY21MH009

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A. ACCIDENT

Location: Greenville, Alabama
Date: June 19, 2021
Time: 1422 central daylight time
1922 coordinated universal time (UTC)
Vehicle: Multiple car accident with fatalities on I-65

B. METEOROLOGIST

Don Eick
Senior Meteorologist
Operational Factors Division (AS-30)
National Transportation Safety Board

C. 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 central daylight time (CDT) based upon the 24-hour clock, local time is +5 hours to UTC, and UTC=Z. Directions are referenced to true north and distances in nautical miles. Heights are in feet (ft) above mean sea level (msl) unless otherwise noted. Visibility is in statute miles and fractions of statute miles.

This report provides a meteorological review of the weather conditions and NWS weather products applicable to the local Greenville, Alabama area around the time of the accident. The accident site was based on the coordinates of latitude 31.94561° N and longitude 86.55875° W, and an elevation of about 397 ft.

D. WEATHER INFORMATION

1.0 Synoptic Conditions

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. Reference to these charts and other weather products documented in this report can be found in the joint NWS and Federal Aviation Administration (FAA) Advisory Circular "Aviation Weather Services", AC 00-45H change 2.

1.1 Surface Analysis Chart

The southeast section of the NWS Surface Analysis Chart for 1300 CDT is included as figure 1 with the approximate accident site marked by a red star. The chart depicted Tropical Storm Claudette¹ with a central pressure at 1007-hectopascals (hPa)² to the west of the accident location with a trough of low pressure extending eastward over Alabama and into southwestern Georgia. The station models in the vicinity of the accident site depicted southeasterly winds of 5 to 15 knots, broken to overcast clouds, with temperatures near 78° Fahrenheit (F), and dew point temperatures in the mid 70's °F.

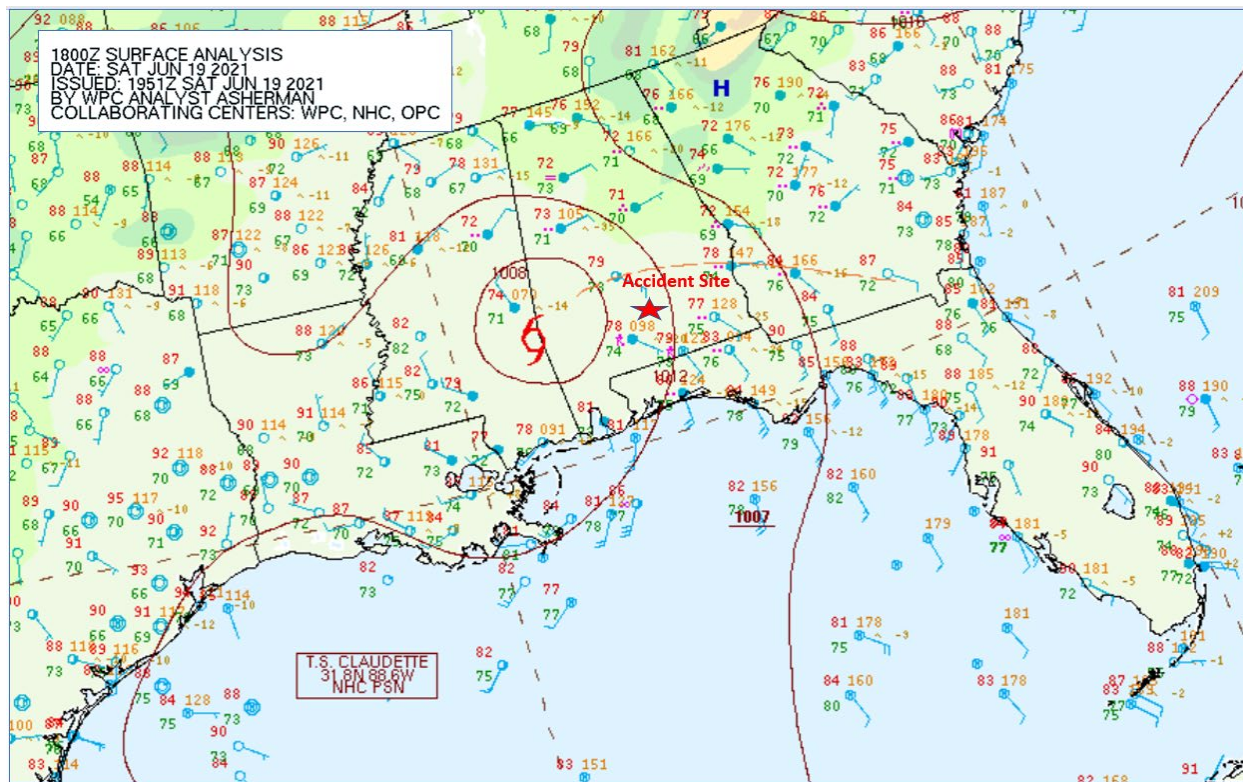


Figure 1 - Southeast section of NWS Surface Analysis Chart for 1300 CDT with approximate accident site.

1.2 National Composite Radar Mosaic

The NWS National Composite Radar Mosaic for 1420 CDT is included as figure 2 with the approximate accident site marked by the red star. The image depicted a large area of precipitation echoes over the southeast associated with Tropical Storm Claudette with an area of strong echoes associated with thunderstorms moving over the accident site marked by the red star. Figures 3 and 4 are enlarged views of the radar image at 1415 and 1420 CDT with the accident site and closest weather reporting station identified. The image depicted a band of echoes moving over the area

¹ Tropical Storm Claudette was the third named storm of the 2021 hurricane season and caused heavy rain and tornadoes across the southeastern United States. A tropical storm by NWS definition is a tropical cyclone that has maximum sustained surface winds ranging from 39-73 mph (34 to 63 knots).

² Hectopascal (hPa) is the international standard for reporting sea-level pressure and is interchangeable with the former term millibar (mb) with the same units. Standard sea-level pressure is 1012.35-hPa at 59° Fahrenheit or 15° Celsius (C).

with maximum reflectivity near 45 dBZ over the accident site at 1415 and echoes of 25 dBZ at 1420 CDT.

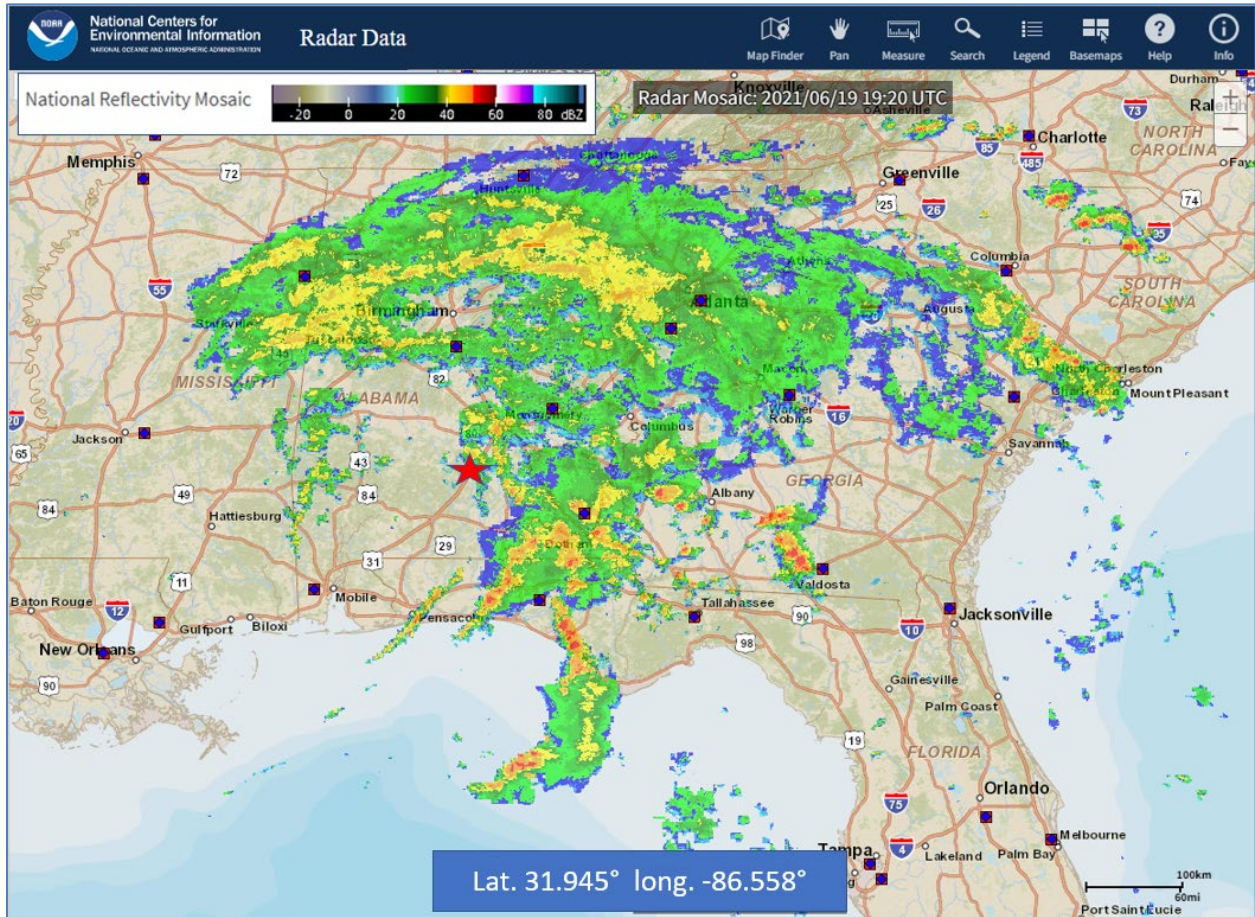


Figure 2 - National Composite Radar Mosaic for 1420 CDT with accident site marked by red star.

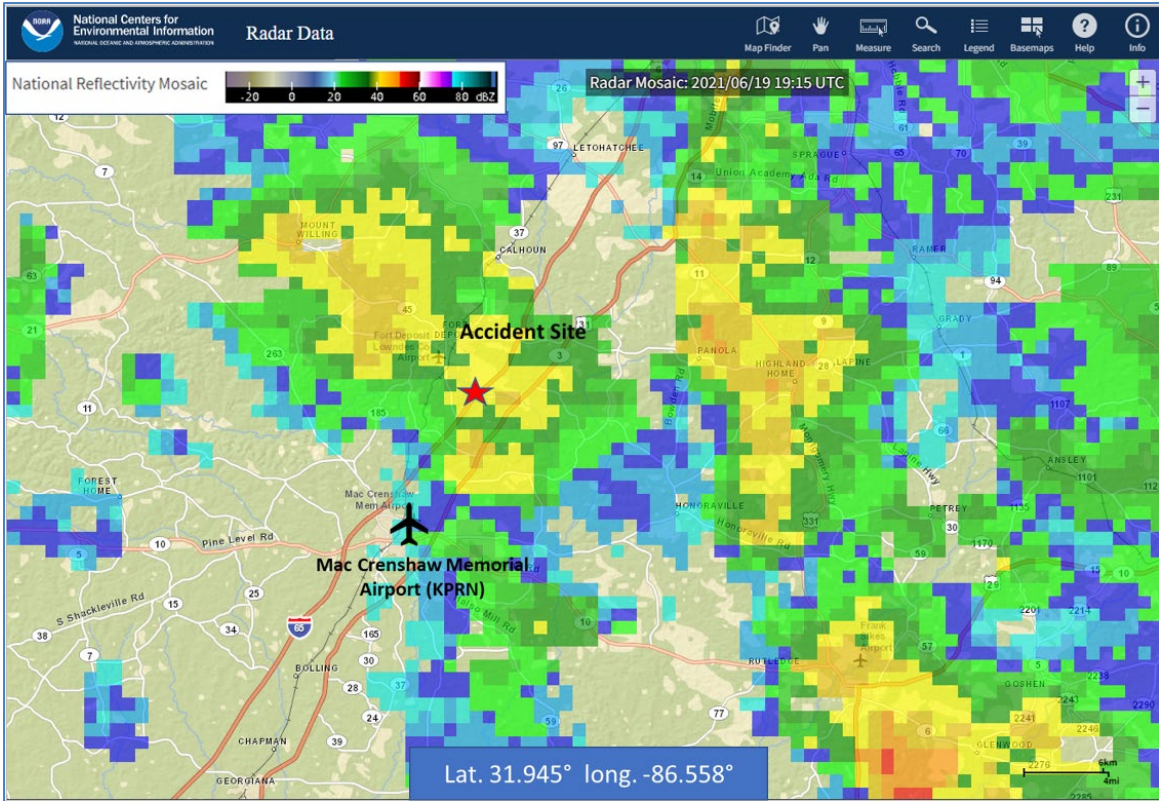


Figure 3 - Close up of NWS radar imagery at 1415 CDT with accident site and closest reporting site.

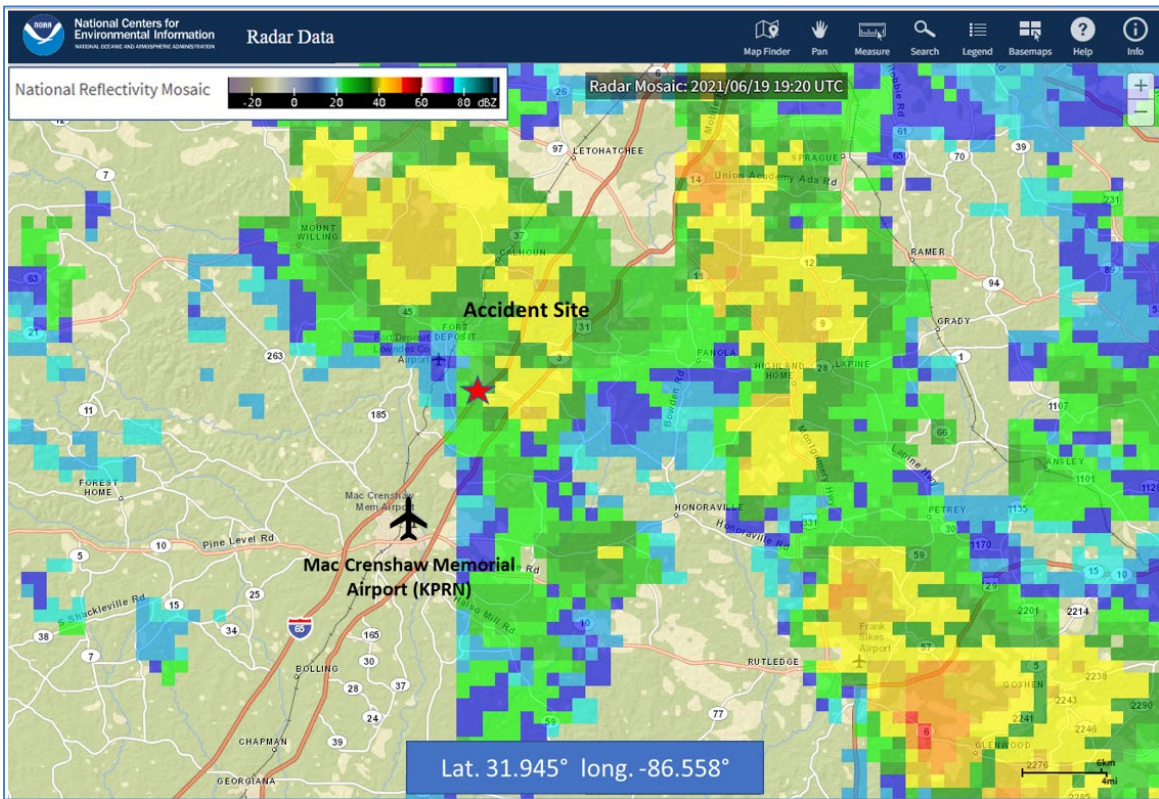


Figure 4 - Close up of NWS radar imagery at 1420 CDT with accident site and closest reporting site.

1.3 12-hour Surface Prognostic Chart

The NWS NCEP 12-hour Surface Prognostic Chart issued during the morning and valid for 1900 CDT is included as figure 5. The chart depicted Tropical Depression Claudette over southwestern Alabama with a large area of likely rain (dark green)³ with a chance of thunderstorms (red hatched)⁴ over Alabama.

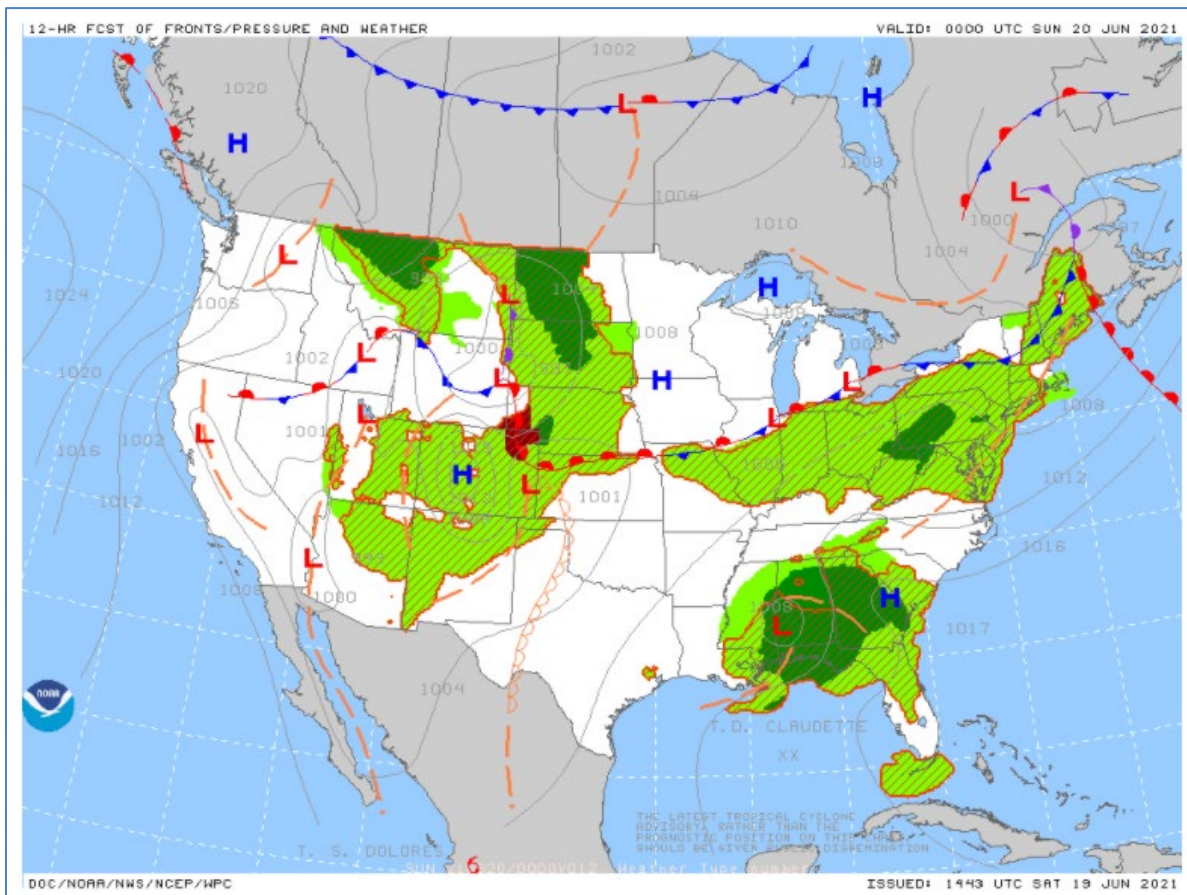


Figure 5 - NWS 12-hour Surface Prognostic Chart valid for 1900 CDT

2.0 Surface Observations

The closest weather reporting facility to the accident site was Mac Crenshaw Memorial Airport (KPRN), in Greenville, Alabama, located approximately 6 1/2 miles south of the accident site at an elevation of 451 ft. The airport had a Federally installed and maintained Automated Surface Observation System (ASOS), whose reports were not augmented. The magnetic variation over the area was 3.5° W. The observations reported surrounding the time of the accident were obtained

³ Likely Rain is defined as measurable rain (>0.01") at the valid time. The probability of precipitation (POP) is 60-70%, with an equivalent areal qualifier as "numerous".

⁴ Chance of Thunderstorm is defined as a chance of thunderstorms at the valid time. The POP is between 30-50%, with an equivalent areal qualifier as "scattered".

and conversions of time from UTC to local, wind speeds from knots to miles per hour (mph), and temperature from °C to °F. Cloud heights are reported above ground level (agl) in the following section.

Special weather observation for KPRN at 1409 CDT, automated observation, wind from 160° at 8 mph gusting to 18 mph, wind variable from 130° to 190°, visibility 3/4 mile in heavy rain, ceiling⁵ broken at 3,000 ft agl, broken clouds at 4,500 ft, overcast clouds at 8,000 ft, temperature 77° F, dew point 72° F, altimeter 29.83 inches of mercury (Hg). Remarks: automated station with a precipitation discriminator, hourly precipitation 0.15 inches, temperature 25.0° C, dew point temperature 22.2° C.

Special weather observation for KPRN at 1415 CDT, automated observation, wind from 150° at 12 mph gusting to 20 mph, visibility 1 1/2 miles in light rain, a few clouds at 1,700 ft agl, ceiling broken at 3,000 ft, overcast clouds at 7,000 ft, temperature 77° F, dew point 72° F, altimeter 29.83 inches of Hg. Remarks: automated station with a precipitation discriminator, hourly precipitation 0.15 inches, temperature 25.0° C, dew point temperature 22.2° C.

Special weather observation for KPRN at 1419 CDT, automated observation, wind from 140° at 14 mph gusting to 25 mph, wind 110° variable 170°, visibility 3 miles in light rain, scattered clouds at 1,300 ft agl, ceiling broken at 3,000 ft, overcast clouds at 4,600 ft, temperature 77° F, dew point 72° F, altimeter 29.83 inches of Hg. Remarks: automated station with a precipitation discriminator, hourly precipitation 0.15 inches, temperature 25.0° C, dew point temperature 22.2° C.

Accident 1422 CDT.

Special weather observation for KPRN at 1434 CDT, automated observation, wind from 180° at 10 mph gusting to 20 mph, visibility 4 miles in light rain, ceiling broken at 1,100 ft agl, broken at 1,400 ft, and overcast at 2,500 ft, temperature 77° F, dew point 72° F, altimeter 29.82 inches of Hg. Remarks: automated station with a precipitation discriminator, hourly precipitation 0.16 inches, temperature 25.0° C, dew point temperature 22.2° C.

A summary table of the observations from KPRN on June 19th is included below with the time reported in CDT, with temperatures and dew point temperatures in °C, wind speeds and gusts in knots, and general prevailing weather phenomena⁶. A review of the longline observations indicated that rain began at 0349 CDT and continued through 1421 CDT with several periods of moderate to heavy rain reported during the period and had ended at the time of the accident with approximately 1.55 inches of rain reported.

⁵ Ceiling is defined as the lowest layer of clouds reported as broken (5/8 to 7/8 sky coverage) or overcast (8/8 coverage), or the vertical visibility into a surface based obscuration.

⁶ Weather (WX) conditions reported include intensity (“-” for light, “_” moderate, and “+” for heavy), precipitation (“RA” rain), and obscurations to visibility (“BR” for mist, and “FG” for fog).

Mac Crenshaw Memorial Airport (KPRN), Greenville, Alabama

Data for 19 Jun 2021																		
ID	TIME	T	TD	RH	DIR	SPD	GST	ALT	SLP	VIS	CIL	COV	WX	MAX	MIN	PR6	PR24	SC
KPRN	0058	23	20	84	40	4		30.02	110	10		CLR		25	23			
KPRN	0158	23	20	84	100	3		29.99	102	10	21	FEW						
KPRN	0258	23	19	81	140	3		29.99	101	10	33	SCT						
KPRN	0358	23	19	81	000	0		29.99	100	9	55	BKN	-RA	RAB44			0.00	
KPRN	0458	22	20	87	90	6		29.97	095	7	85	OVC	-RA					
KPRN	0558	23	21	88	100	5		29.98	098	6	70	BKN	-RA	BR				
KPRN	0658	23	21	88	100	9		29.94	085	5	110	BKN	-RA	BR	23	22	0.14	
KPRN	0758	23	21	88	110	9	16	29.97	095	4	50	OVC	RA	BR				
KPRN	0848	24	22	88	120	15	24	29.95		2.5	3	BKN	RA	BR				
KPRN	0958	24	21	84	150	12	26	29.91	075	3	95	OVC	RA				0.54	
	1054	23	21	88	160	10	21	29.92		3	10	OVC	-RA					
	1145	23	21	88	VRB	5	19	29.90		¾	10	OVC	+RA					
	1246	24	22	88	140	6		29.87		4	12	OVC	-RA	BR				
	1258																	0.67
KPRN	1358	25	22	85	160	9		29.84	050	5	65	OVC	-RA					
	1402	25	22	85	180	9	16	29.84		1¾	46	OVC	+RA					
	1409	25	22	85	160	7	16	29.83		¾	30	OVC	+RA					
	1415	25	22	85	150	10	17	29.83		1½	30	OVC	-RA					
	1419	25	22	85	140	12	22	29.83		3	30	OVC	-RA					
	1422	Accident																
	1434	25	22	85	180	9	17	29.82		4	11	OVC	-RA					
	1444	25	22	83	170	9	16	29.82		4	10	OVC	-RA					
KPRN	1558	26	22	79	VRB	6	18	29.78	029	10	21	OVC					0.20	
KPRN	1658	26	23	84	VRB	6		29.77	026	10	14	OVC						
KPRN	1758	27	23	79	200	10	17	29.75	021	10	22	BKN						
KPRN	1858	26	21	73	190	11	22	29.76	023	10	60	OVC						

Attachment 1 is the NWS Local Climatological Data – Daily Summary and Hourly Observation Logs⁷ for Greenville for June 19, 2021, which includes all the observations issued during the period and is more detailed than the summary list above. The total precipitation reported on June 19th was 1.72 inches total for the day. The heaviest precipitation was reported between 0700 and 1300 CDT with visibility under 2 statute miles.

3.0 Satellite Imagery

Geostationary Operational Environmental Satellite number 16 (GOES-16) imagery were 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. The infrared and visible imagery were reviewed surrounding the period, and the closest images to the accident time documented. The infrared long wave imagery (band 13) at a wavelength of 10.3 microns (µm) provided radiative cloud top temperatures with a nominal spatial resolution of 2 km. The visible imagery (band 2) at a wavelength of 0.64 µm also provided the highest resolution of 0.5 km.

Figure 6 is the GOES-16 infrared image for 1421 CDT at 2X magnification with a MB color enhancement curve applied to highlight the higher and colder cloud tops typically associated with deep convection, and the accident site marked by a white square. The image depicted most of the

⁷ Note the time used in the Local Climatological Data is reference to local standard time (LST). The time of the accident was 1322 LST.

activity associated with Tropical Depression Claudette far from the center's circulation over western Alabama, with several bands of clouds extending from the Gulf of Mexico into the Florida panhandle and southeastern Alabama, then wrapping northward across northern Alabama. The accident site was located on the western edge of an enhanced band of clouds with multiple layers of low and mid-level clouds. The radiative cloud top temperature over the accident site was 259 Kelvin or -14°C , which corresponded to cloud tops near 24,000 ft.

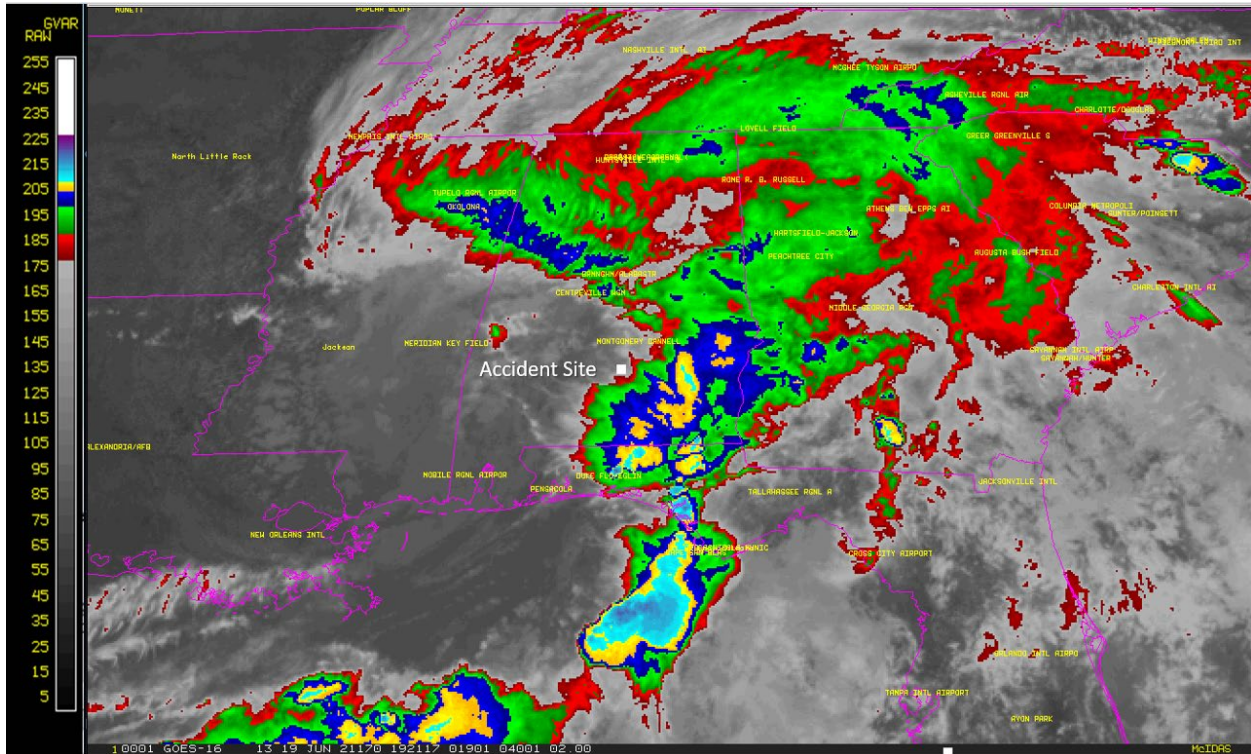


Figure 6 - GOES-16 infrared image for 1421 CDT at 2X magnification with accident site marked

Figure 7 is the GOES-16 visible image for the same period of 1421 CDT at 2X magnification with the accident site marked by the red star. An overcast layer of low to mid-level clouds extended over the accident site, with some high cirriform type clouds to the east. Several defined embedded convective clouds were identified to the east-southeast and southeast of the accident site, with another area of cumulonimbus clouds over western Alabama.

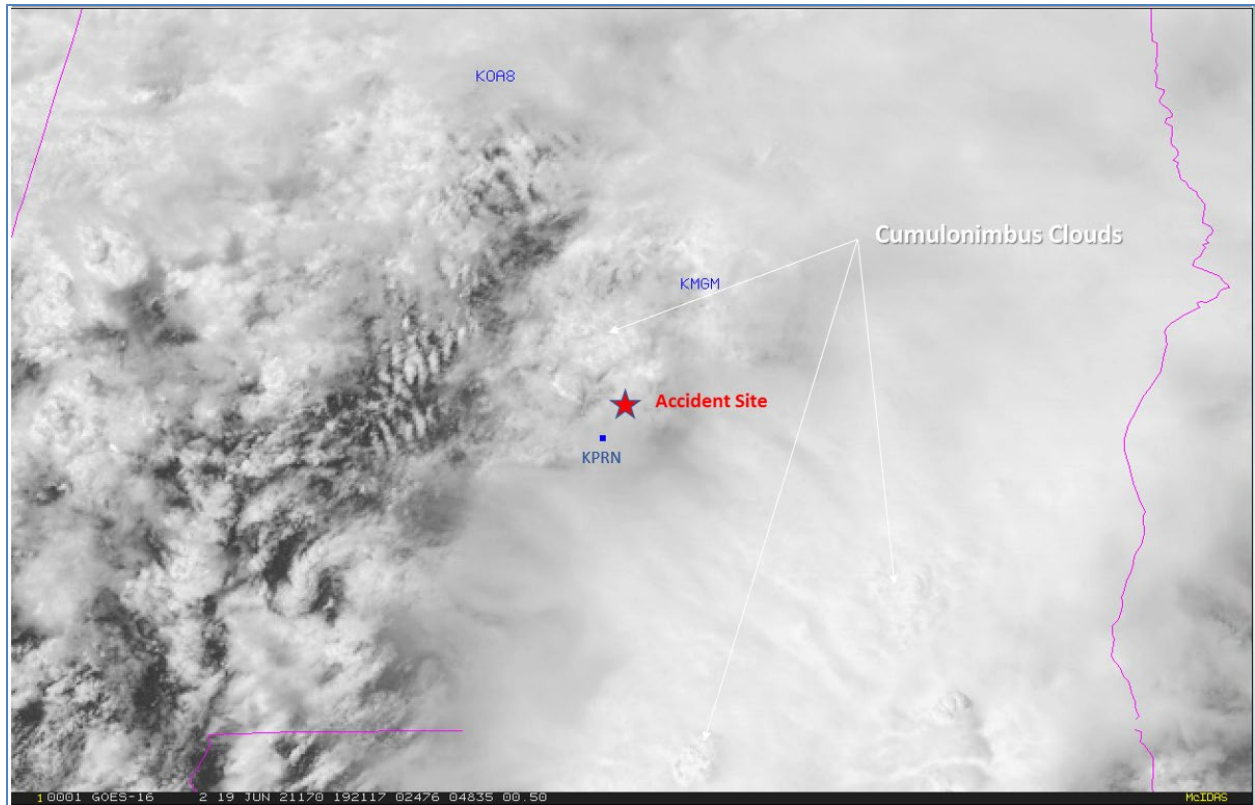


Figure 7 - GOES-16 visible image for 1526 CDT at 2X magnification

4.0 Weather Radar Imagery

The closest Weather Surveillance Radar 1988 Doppler (WSR-88D⁸) was located 52 miles northeast of the accident site at Maxwell Air Force Base (KMXX), with the radar antenna located in Carville to the east-northeast of Montgomery, Alabama. The level II archive data was obtained from the NCEI and displayed using the NWS NEXRAD Interactive Viewer and Data Exporter software. The NWS National Severe Storm Laboratory (NSSL) Multi-Radar Multi-Sensor System (MRMS) imagery was also documented to depict the precipitation products over the area during the period. The MRMS is a system with fully automated algorithms that integrate data streams from multiple radars, surface and upper air observations, lightning detection systems, satellite imagery, and forecast models. The MRMS reads in all radar observations from all the NWS WSR-88D, and FAA Terminal Doppler Weather Radar (TDWR) to create a seamless, three dimensional mosaics of radar reflectivity.

⁸ The WSR-88D is a S-band 10-centimeter wavelength radar with a power output of 750,000 watts, with a 28-foot parabolic antenna concentrating the energy into a 0.95° beam width. The radar produces three basic types of products reflectivity, radial velocity, and spectral width.

4.1 Reflectivity

Reflectivity is the measure of the efficiency of a target in intercepting and returning radio energy. With hydrometeors⁹, it is a function of the drop size distribution, number of particles per unit volume, physical state (ice or water), shape, and aspect. Reflectivity is normally displayed in decibels (dBZ) and is a general measure of echo intensity. Figure 8 relates the NWS former video integrator and processor (VIP) intensity levels (1-6) versus the WSR-88D's display levels (0-15), precipitation mode reflectivity in decibels (DBZ), and rainfall rates.

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

Figure 8 - NWS VIP Levels, WSR-88D levels, reflectivity in dBZ, and rainfall rates.

Current radar phraseology generally describes echoes less than 30 dBZ as “light”, “moderate” echoes of 30-40 dBZ, “heavy” with echoes of >40-50 dBZ, and “extreme” echoes above >50 dBZ.

4.2 Base Reflectivity Imagery

The KMXX WSR-88D 0.53° base reflectivity image for 1420:41 CDT is included as figure 9 with the accident site marked in white. The image reflects the conditions between approximately 2,650 to 7,890 ft over the accident site. The image depicted the accident site on the southwest side of a band of heavy intensity echoes with very light intensity echoes of 15 dBZ or less over the accident site and over KPRN along I-65 which were likely associated with light rain.

⁹ Hydrometeors are any product of condensation or sublimation of atmospheric water vapor, whether formed in the free atmosphere or at 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 glaze ice.

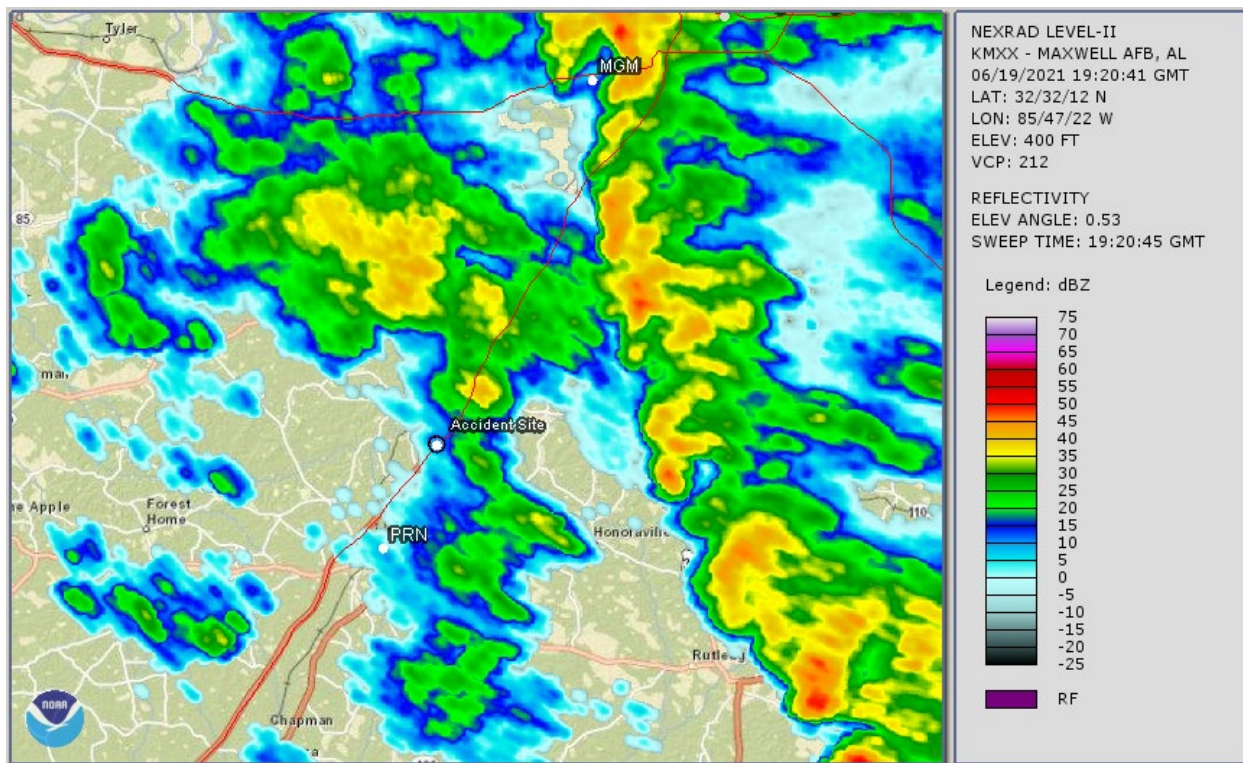


Figure 6 - Maxwell Air Force Base WSR-88D 0.53° base reflectivity image for 1420:40 CDT

4.3 MRMS Base Reflectivity Imagery

The MRMS base reflectivity data is the lowest elevation scan of 0.5° with a spatial resolution of 0.01° Latitude (1.11 km) X 0.01° longitude (1.01 km). The MRMS radar imagery was reviewed for the period of precipitation over the Greenville area between 0300 and 2030 CDT. One of the most intense periods of rain was noted around 1145 CDT when KPRN reported heavy rain. Figure 10 is the MRMS lowest elevation base reflectivity image at 1150 CDT when a “heavy” intensity area of echoes between 45-50 decibels (dBZ) was observed moving over the accident location. Echoes were observed over the area until about 1500 CDT, with the accident occurring shortly before at 1422 CDT.

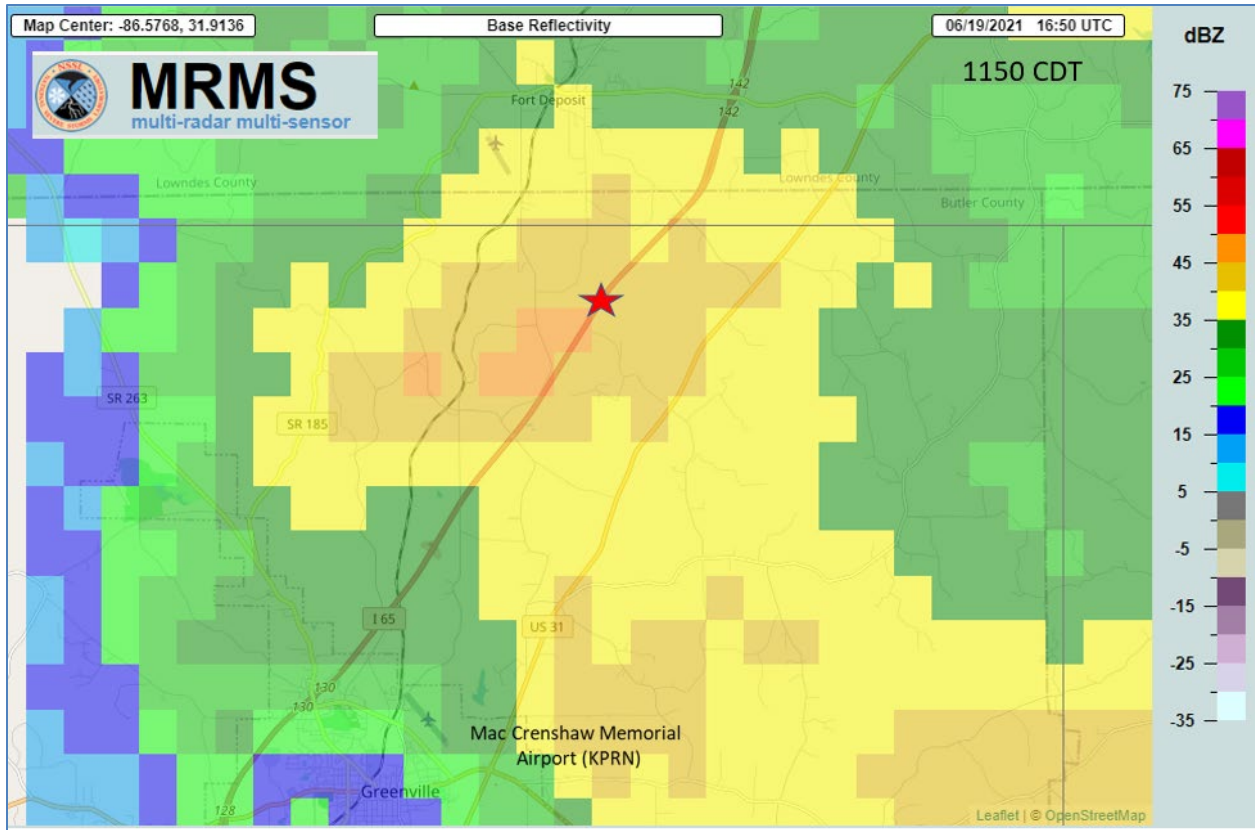


Figure 7 - MRMS base reflectivity image for 1150 CDT with the accident site marked.

4.4 MRMS 12-hour Quantitative Precipitation Estimate

The 12-hour Quantitative Precipitation Estimate (QPE) is an aggregation of the 1-hour Surface Precipitation Rate (SPR) field, which is updated every 2-minutes and provide data for the previous 60-minutes are summarized to create the QPE ending at the indicated time. It is used to provide timely information for warning operations and to verify quantitative precipitation forecasts to help improve numerical weather prediction.

Figure 11 is the MRMS 12-hour QPE radar imagery ending at 1500 CDT with the approximate accident site marked by the red star. The image depicted an average of 1.50 to 2.00 inches of precipitation over I-65 and the accident site prior to the accident.

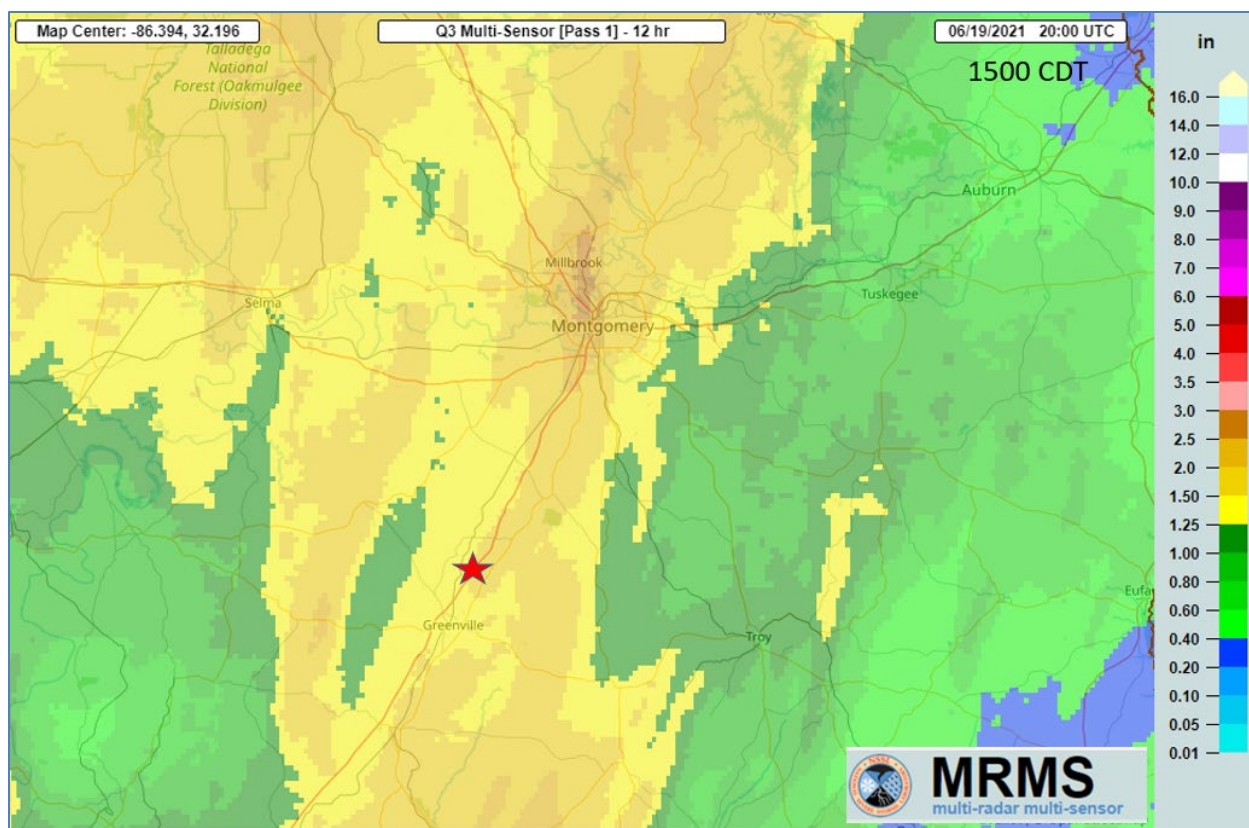


Figure 8 - MRMS 12-hour QPE ending at 1500 CDT with accident site marked by red star.

5.0 Tropical Storm Claudette Summary

According to the NWS National Hurricane Center (NHC) Tropical Storm Claudette formed in the Gulf of Mexico off the Louisiana coast on Thursday June 17, 2021, at approximately 1600 CDT and moved ashore near Houma, Louisiana, with a storm surge of 2-3 ft on June 19th. The storm then moved northeastward across southern Louisiana, Mississippi, into Alabama. At 1300 CDT on June 19th the storm was located at 31.8° N 88.6° W or about 140 miles west-southwest of Mobile, Alabama. The storm had maximum sustained winds of 40 mph with higher gusts and was moving north-northeast at 14 mph, with a central pressure of 29.74 inches of Hg (1007-hPa). The NWS NHC advisories indicated that Claudette was expected to produce rainfall totals of 5 to 10 inches with isolated maximum amounts of 15 inches across portions of coastal Mississippi and Alabama, and the western Florida Panhandle during the period. The storm produced several tornadoes across southern Alabama and in the Florida panhandle. One of the strongest was an EF-2 tornado near Brewton, Alabama, that had a track of 22 miles and injured 20 individuals.

Figure 12 is the NWS NHC graphic display of Advisory 8A issued at 1300 CDT June 19, 2021, which depicted the position of then Tropical Storm Claudette by the orange circle with the forecast 5-day track in black. The stages of tropical depression¹⁰ were depicted as “D” and expected redevelopment to tropical storm strength by the “S”.

¹⁰ A tropical depression is a tropical cyclone that has maximum sustained surface winds (one-minute average) of 38

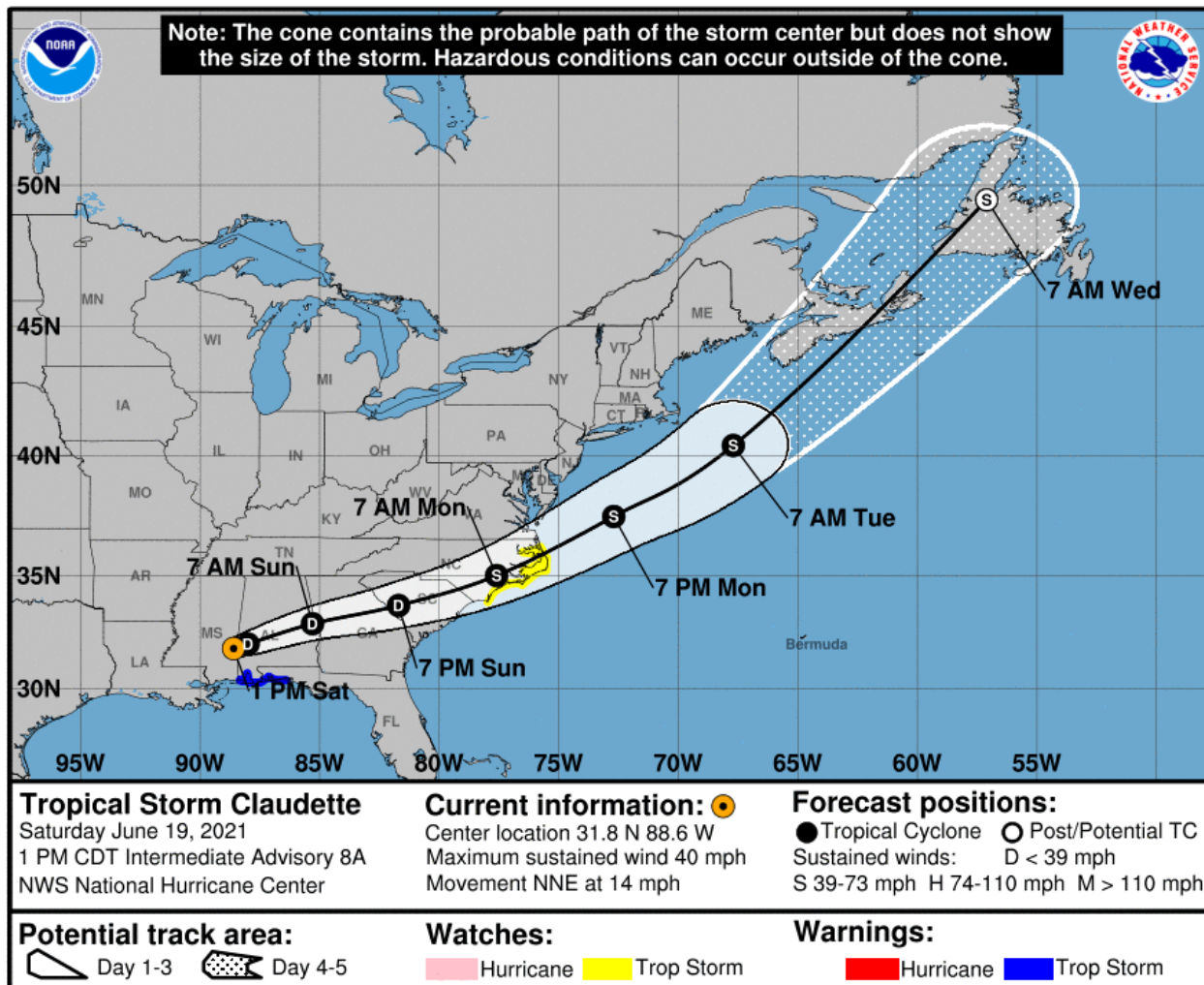


Figure 9 - NHC Tropical Depression Claudette Advisory #8A issued at 1300 CDT

Tropical Depression Claudette Advisory number 8A is included below.

ZCZC MIATCPAT3 ALL
 TTAA00 KNHC DDHHMM

BULLETIN
 Tropical Storm Claudette Intermediate Advisory Number 8A
 NWS National Hurricane Center Miami FL AL032021
 100 PM CDT Sat Jun 19 2021

...BANDS OF HEAVY RAIN AND GUSTY WINDS STILL AFFECTING PORTIONS OF
 THE NORTHERN GULF COAST...

SUMMARY OF 100 PM CDT...1800 UTC...INFORMATION
 LOCATION...31.8N 88.6W

mph (33 knots) or less.

*ABOUT 80 MI...130 KM NNW OF MOBILE ALABAMA
ABOUT 140 MI...225 KM WSW OF MONTGOMERY ALABAMA
MAXIMUM SUSTAINED WINDS...40 MPH...65 KM/H
PRESENT MOVEMENT...NNE OR 30 DEGREES AT 14 MPH...22 KM/H
MINIMUM CENTRAL PRESSURE...1007 MB...29.74 INCHES*

*WATCHES AND WARNINGS
CHANGES WITH THIS ADVISORY:*

The Tropical Storm Warning from the Mississippi/Alabama border to the Mouth of the Mississippi River has been discontinued.

SUMMARY OF WATCHES AND WARNINGS IN EFFECT:

A Tropical Storm Warning is in effect for...

** Mississippi/Alabama border to the Okaloosa/Walton County line Florida.*

A Tropical Storm Watch is in effect for...

** Cape Fear to Duck, North Carolina*

** Pamlico and Albemarle Sounds*

A Tropical Storm Warning means that tropical storm conditions are expected somewhere within the warning area.

A Tropical Storm Watch means that tropical storm conditions are possible within the watch area, generally within 48 hours.

Interests elsewhere along the northern Gulf Coast and across the southeast U.S. should monitor the progress of this system.

For storm information specific to your area, including possible inland watches and warnings, please monitor products issued by your local National Weather Service forecast office.

DISCUSSION AND OUTLOOK

At 100 PM CDT (1800 UTC), the center of Tropical Storm Claudette was located near latitude 31.8 North, longitude 88.6 West. Claudette is moving toward the north-northeast near 14 mph (22 km/h). A turn toward the northeast is expected later today, followed by a motion toward the east-northeast tonight or Sunday. On the forecast track, the system should move farther inland across portions of the southeast U.S. through Sunday night, and over the western Atlantic Ocean on Monday.

Maximum sustained winds are near 40 mph (65 km/h) with higher gusts. Claudette is expected to weaken to a tropical depression later today, however, Claudette is forecast to become a tropical storm again when it moves across the Carolinas Sunday night or early Monday.

Tropical-storm-force winds extend outward up to 205 miles (335 km) southeast of the center.

The estimated minimum central pressure based on surface observations is 1007 mb (29.74 inches).

HAZARDS AFFECTING LAND

Key messages for Claudette can be found in the Tropical Cyclone Discussion under AWIPS header MIATCDAT3, WMO header WTNT43 KNHC, and on the web at www.hurricanes.gov/graphics_at3.shtml?key_messages.

RAINFALL: Claudette is expected to produce rainfall totals of 5 to 10 inches with isolated maximum amounts of 15 inches across portions of coastal Mississippi and Alabama, and the western Florida Panhandle through the afternoon. Considerable flash, urban and small stream flooding impacts as well as new and renewed minor to isolated moderate river flooding are likely across these areas.

As the system continues to lift northeast through the weekend, heavy rain will occur across central Alabama, central and northern Georgia, and into the Piedmont of the Carolinas, resulting in rainfall totals of 3 to 6 inches with isolated maximum amounts of 8 inches. Flash, urban, small stream and isolated minor river flooding impacts are possible.

STORM SURGE: The combination of storm surge and the tide will cause normally dry areas near the coast to be flooded by rising waters moving inland from the shoreline. The water could reach the following heights above ground somewhere in the indicated areas if the peak surge occurs at the time of high tide...

*MS/AL Border to Okaloosa/Walton County Line, FL...2-3 ft Mobile Bay...2-3 ft
Okaloosa/Walton County Line, FL to Panama City, FL...1-2 ft
Pensacola Bay, Choctawhatchee Bay, Saint Andrew Bay...1-2 ft*

Cape Lookout, NC to NC/VA Border...1-3 ft

Surge-related flooding depends on the relative timing of the surge and the tidal cycle, and can vary greatly over short distances. For information specific to your area, please see products issued by your local National Weather Service forecast office.

WIND: Tropical storm conditions should continue along the coast in the warning area for a couple of more hours. Tropical storm conditions are possible in the watch area Sunday night and Monday.

TORNADOES: A few tornadoes are possible today and tonight across southeast Alabama, the western Florida Panhandle, and southwest Georgia.

NEXT ADVISORY

Next complete advisory at 400 PM CDT.

Forecaster Cangialosi

The advisory #8A indicated that Claudette was expected to produce additional rainfall totals of 3 to 6 inches with isolated maximum amounts of 8 inches across eastern Alabama, northern Georgia, the Florida Panhandle, and South and North Carolina. Flash, urban, and small stream flooding impacts as well as new and renewed minor to isolated moderate river flooding was also likely across those areas. The storm total rainfall was expected to be in the 5 to 10 inches range with isolated 15 inch totals in southeast Louisiana, southern Mississippi, southern Alabama, and the western Florida panhandle. The advisory also indicated that a few tornadoes were possible during the period across southeast Alabama, the western Florida Panhandle, and southwest Georgia.

6.0 Mesoscale Precipitation Discussion

The NWS Weather Prediction Center issued a Mesoscale Precipitation Discussion #0355 at 1420 CDT on June 19, 2021, and its associated graphic is depicted as figure 13 and followed by the text.

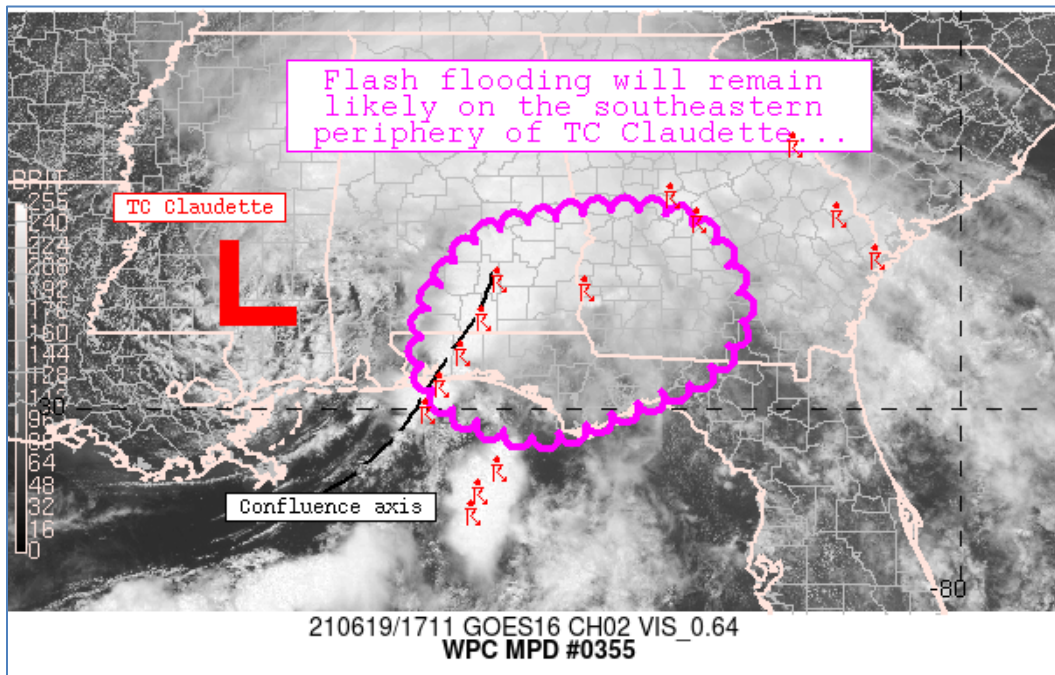


Figure 10 - NWP Mesoscale Precipitation Discussion #0355 issued at 1420 CDT

The text of the mesoscale precipitation discussion was as follows:

*Mesoscale Precipitation Discussion 0355
NWS Weather Prediction Center College Park MD
120 PM EDT Sat Jun 19 2021*

Areas affected...southeastern Alabama, Florida Panhandle, and southwestern Georgia

Concerning...Heavy rainfall...Flash flooding likely

Valid 191718Z - 192318Z

Summary...Slow-moving convection on the southeastern periphery of Tropical Cyclone Claudette will continue a risk of flash flooding especially in the Florida Panhandle and vicinity through 00Z.

Discussion...Most of the heaviest convection on the southeastern periphery of Claudette has been confined to one or two dominant convective bands over the past 6 hours or so. The bands are focused along a strongly confluent low-level wind field, which has supported ascent within a very moist (2.2+ inches PW) and unstable (2000+ J/kg MLCAPE) environment, allowing for areas of 2-3.5 inch-per-hour rainfall rates at times. The bands have produced widespread areas of 2-5 inches of rain and isolated amounts as high as 7.5. The highest amounts have so far been confined to land areas nearer the stronger instability (located within 100 mi of the coast and areas offshore).

These trends should continue through the evening hours. HRRR/HREF/Nam and other guidance suggests that at least one or two bands of convection should persist or gradually become more elongated from southwest to northeast across the discussion area. The localized training of convection will continue to allow for widespread heavy rain to shift eastward, with many areas of 2-5 inch rainfall (and locally higher amounts) to occur across the discussion area. The rainfall rates have overwhelmed flash flood guidance (especially in flood-prone areas) and resulted in flash flood impacts - especially in the Pensacola area recently.

Cook

ATTN...WFO...BMX...FFC...JAX...MOB...TAE...

ATTN...RFC...SERFC...NWC...

LAT...LON 32648425 32248332 31328294 30888307 30418348
30178409 29738512 29638587 30128700 30968719
31748690 32298635 32508549

7.0 Qualitative Precipitation Forecasts

The 6- and 12-hour Qualitative Precipitation Forecast (QPF) issued by the WPC at 0700 CDT and valid for 1300 CDT and 1900 CDT are included as figures 14 and 15 respectively. The forecasts depicted maximum rainfall over the coastal sections of Alabama and the Florida Panhandle, with precipitation rates near 1.50 to 2.00 inches over the Greenville area.

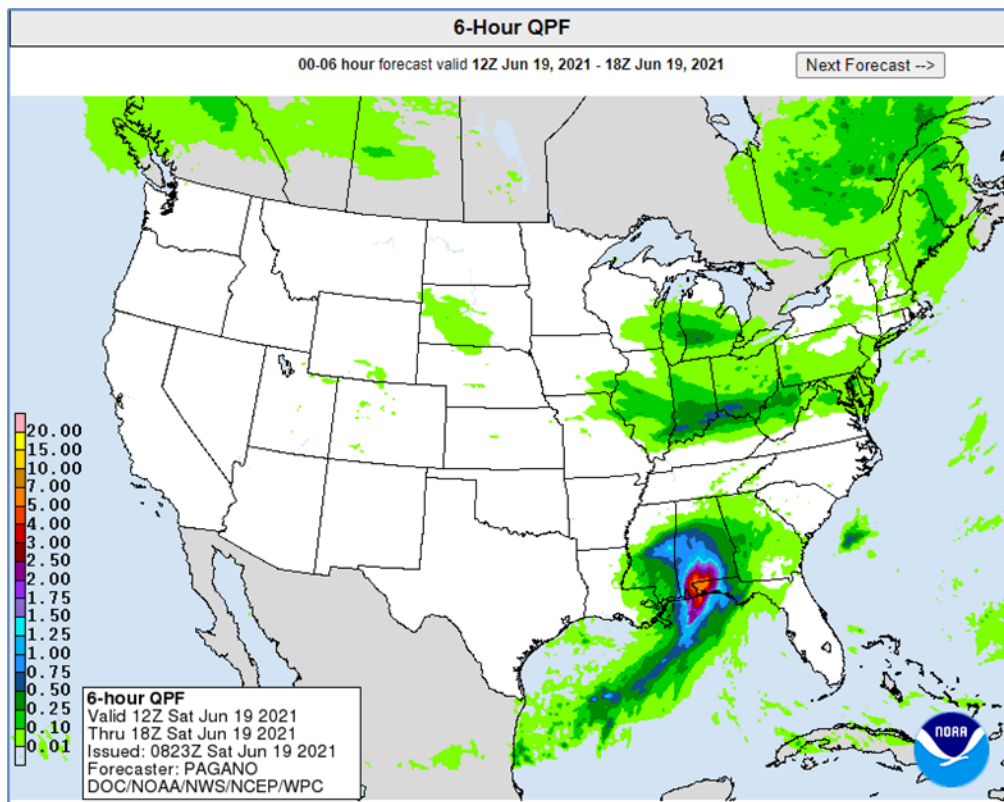


Figure 11 - QPE 6-hour precipitation forecast valid for 1300 CDT

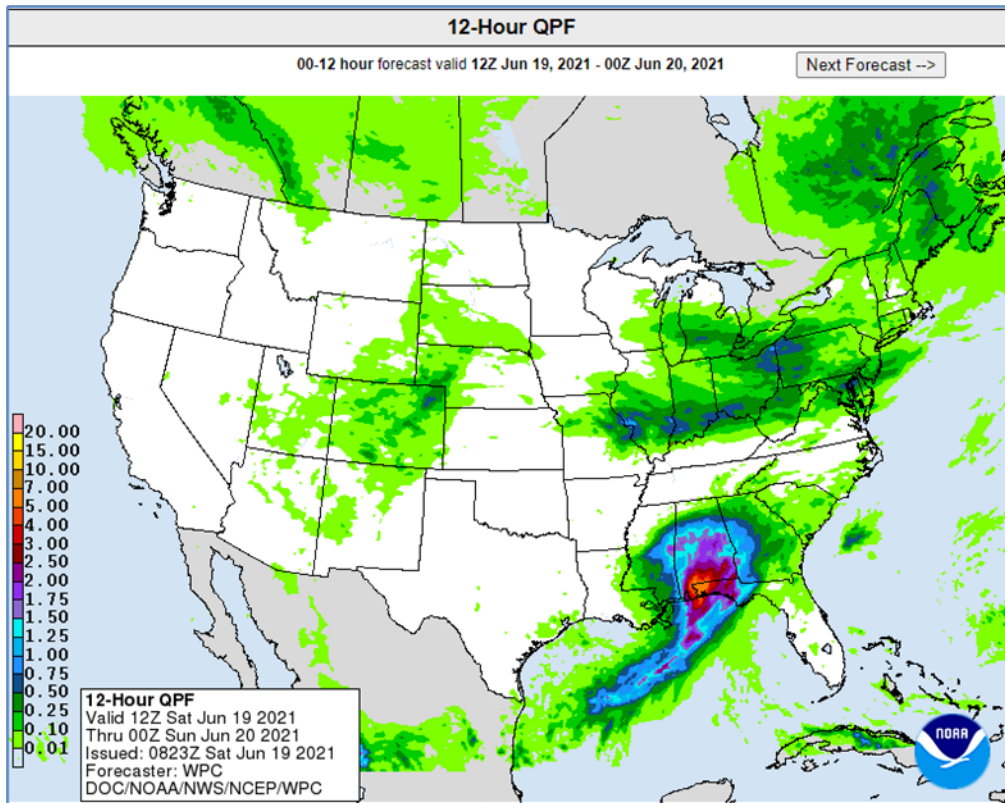


Figure 12 - QPE 12-hour precipitation forecast issued at 1900 CDT

8.0 NWS Mobile Forecasts and Advisories

The NWS Mobile (KMOB), Alabama, Weather Forecast Office (WFO) was responsible for the area where the accident occurred. The following weather forecast, advisories, and bulletins were issued surrounding the period.

8.1 Zone Forecast

The NWS KMOB WFO Zone Forecast for the Greenville area, Butler County, Alabama area is included below, which provided a plain language forecast for the week and is typically used by local weather broadcasts to the public. The forecasts issued prior to the accident were as follows.

*FPUS54 KMOB 190956
ZFPMOB*

*Zone Forecast Product
National Weather Service Mobile AL
456 AM CDT Sat Jun 19 2021*

*ALZ057-192130-
Butler- Including the city of Greenville
456 AM CDT Sat Jun 19 2021*

...FLASH FLOOD WATCH IN EFFECT THROUGH LATE TONIGHT...

.TODAY...Not as warm. Showers and chance of thunderstorms. Locally heavy rainfall possible. Highs in the upper 70s. Southeast winds 10 to 15 mph with gusts to around 30 mph. Chance of precipitation near 100 percent.

.TONIGHT...Showers and chance of thunderstorms. Lows in the lower 70s. Southeast winds 15 to 20 mph becoming southwest 5 to 10 mph after midnight. Chance of precipitation near 100 percent.

.SUNDAY...Showers and chance of thunderstorms in the morning, then showers likely and chance of thunderstorms in the afternoon. Highs in the mid 80s. West winds 10 to 15 mph. Chance of precipitation 80 percent.

The forecast expected a 100% probability of precipitation, with locally heavy rainfall. High temperatures in the 70's °F, and southeast winds of 10 to 15 mph with gusts to 30 mph. A Flash Flood Watch¹¹ was in effect during the period. The afternoon update was issued at 1446 CDT and continued the expectation of rain.

*FPUS54 KMOB 191946
ZFPMOB*

*Zone Forecast Product
National Weather Service Mobile AL
246 PM CDT Sat Jun 19 2021*

*ALZ057-192115-
Butler-Including the city of Greenville
246 PM CDT Sat Jun 19 2021*

***...FLASH FLOOD WATCH IN EFFECT THROUGH LATE TONIGHT...
...TORNADO WATCH 285 IN EFFECT UNTIL 7 PM CDT THIS EVENING...***

.REST OF TODAY...Not as warm. Showers and chance of thunderstorms. Some thunderstorms may produce heavy rainfall. Locally heavy rainfall possible. Near steady temperature in the upper 70s. Southeast winds 15 to 20 mph. Chance of precipitation 80 percent.

.TONIGHT...Showers likely and chance of thunderstorms. Lows in the lower 70s. South winds 5 to 15 mph shifting to the west after midnight. Chance of precipitation 70 percent.

The forecast issued at 1446 CDT continued to expect southeasterly winds of 15 to 20 mph, with an approximately 80% chance of rain and thunderstorms. The advisory also indicated that a Flash Flood Watch was in effect until late that night, and Tornado Watch number 285 was in effect until 1900 CDT.

8.2 Area Forecast Discussion

The NWS Area Forecast Discussions (AFD) are issued by each WFO to describe the short-term weather conditions within their region with a marine section that includes the general conditions as they relate to the creation of the zone forecast or coastal forecast. The discussion

¹¹ A Flood Watch is issued when conditions are favorable for a specific hazardous weather event to occur. A Flood Watch is issued when conditions are favorable for flooding. It does not mean flooding will occur, but it is possible.

also gives some reasoning behind the forecast. These are generated roughly every 6 hours and corresponds to the release of the latest forecast for that office. The NWS KMOB WFO issued the AFD at 1307 CDT for the southern Alabama area and was as follows.

*FXUS64 KMOB 191807
AFDMOB*

*Area Forecast Discussion
National Weather Service Mobile AL
107 PM CDT Sat Jun 19 2021*

.NEAR TERM /Now Through Sunday/...Tropical Storm Claudette continues to track to the north-northeast this afternoon across southeastern MS, eventually tracking into southwestern/west-central AL this evening into tonight. After a very busy morning with multiple embedded tornadic supercells we are finally seeing light at the end of the tunnel. The line of heavy showers and thunderstorms is over south-central AL stretching from offshore the FL/AL coastline northeast across the FL panhandle into Covington county. This line will gradually shift east, moving out of the CWA over the next hour or so. In its wake, the sun has poked out as cloud cover becomes broken with mid-level dry air punching in on the south side of Claudettes circulation. This will allow for temperatures to warm this afternoon into the lower 80's for most locations. Isolated to scattered showers and thunderstorms remain probable today into tonight over much of the region. Multiple hazards still remain in place for much of the area, and are detailed below.

Inland Hazards:

We continue to have several hazards in place across the area, including a wind advisory, tornado watch, tropical storm warning, and flash flood watch.

Wind Advisory: A wind advisory remains in place across our Alabama and FL counties. Strong winds will continue to mix down through tonight as strong low level winds above the surface continue to push across the area. Generally expect wind gusts of 30 to 40mph to occur.

Tornado Watch: A tornado watch remains in place across south-central AL into the central FL panhandle, with greatest threat lingering across Okaloosa and Covington counties where the line of strongest convection is slowly pushing east. The tornado threat should diminish over the next couple of hours. In the meantime, an environment favorable for tornadoes exists with MLCAPE values approaching 1,500j/kg overlapping strong low level SRH values upwards of 200m²/s² in the lowest 500m. SFC-3km SRH values approach 400 to 500m²/s². Given the CAPE/shear overlap, low topped supercells embedded within the line and in advance of the line are possible until the line has cleared the area.

Tropical Storm Warning: A tropical storm warning remains in place for southern/central Mobile and Baldwin counties where wind gusts upwards of 40mph remain possible through this afternoon and evening. Winds should continue to gradually wind down and the warning may be allowed to expire later this afternoon.

Flash Flood Watch: A flash flood watch remains in effect for all of the CWA. Additional heavy rainfall remains possible this afternoon and evening with additional totals of 1 to 3" possible. Along and east of the ongoing convective line, additional totals of 4 to 6" remain possible. High PWATs around 2 to 2.5" remain in place across the area, and with deep forcing associated with Claudette intense tropical downpours remain likely in any shower or thunderstorm. Flash flood guidance is low given the heavy rainfall we have seen, and the threat for flash flooding remains.

Coastal Hazards:

Several coastal hazards remain in place, with a Coastal Flood Advisory, High Risk of Rip Currents, High Surf Warning, and Tropical Storm Warning in effect. Each is detailed below.

Coastal Flood Advisory: Remains in effect through 7AM CDT Sunday. Flooding of low lying, flood prone areas of coastal central Baldwin and Mobile counties, and coastal Mobile, Baldwin, and Escambia counties remains possible.

High Surf Warning: A high surf warning remains in place through 6AM CDT Monday as large breaking waves of 7 to 12 feet is expected along the FL/AL coastline.

Tropical Storm Warning: Tropical storm conditions remain persistent across coastal areas of FL/AL and offshore over the open gulf waters, bays and sounds. Recent wind gusts observed over the region have suggested generally 20 to 30mph sustained (locally higher to 40mph) with gusts of 35 to 45mph have been common late this morning and early afternoon. Given this, the tropical storm warning remains in effect until further notice.

Rip Currents: A high risk of rip currents remains in place through the near term period. Strong southerly winds with rough waters and surf will promote strong rip currents.

For the rest of the forecast period tonight through Sunday, anticipate isolated to scattered showers and thunderstorms as Claudette continues northeast/east-northeast into central AL and western GA. Temperatures will remain warm tonight in the lower to middle 70's. Sunday highs should be warmer than today generally in the lower to perhaps middle 80's if enough sun can peak out and precipitation coverage remains at bay. MM/25

.AVIATION...

18Z issuance...MVFR conditions prevail in the wake of intense convection over south-central AL and the FL panhandle. Isolated to scattered showers and storms remain possible through tonight and tomorrow across the region. IFR conditions remain possible under any intense convection, however that will be isolated and under only the heaviest showers and storms. Gusty southerly winds remain possible, with upwards of 30 to 40mph wind gusts possible across AL and the FL panhandle. MM/25

.MOB WATCHES/WARNINGS/ADVISORIES...

AL...Flash Flood Watch through late tonight for ALZ051>060-261>266.

Wind Advisory until 1 AM CDT Sunday for ALZ052-053-055-056-059-060-261-262.

Coastal Flood Advisory until 7 AM CDT Sunday for ALZ263>266.

Tropical Storm Warning for ALZ263>266.

High Rip Current Risk through Tuesday evening for ALZ265-266.

High Surf Warning until 6 AM CDT Monday for ALZ265-266.

FL...Flash Flood Watch through late tonight for FLZ201>206.

Wind Advisory until 1 AM CDT Sunday for FLZ201-203-205.

Coastal Flood Advisory until 7 AM CDT Sunday for FLZ202-204-206.

Tropical Storm Warning for FLZ202-204-206.

High Rip Current Risk through Tuesday evening for FLZ202-204-206.

High Surf Warning until 6 AM CDT Monday for FLZ202-204-206.

MS...Flash Flood Watch through late tonight for MSZ067-075-076-078-079.

GM...Tropical Storm Warning for GMZ630>636-650-655-670-675.

This product is also available on the web at:

<http://weather.gov/mob>

8.3 Tornado Watches

The NWS Storm Prediction Center (SPC) issued Tornado Watch¹² number 285 at 0935 CDT and was valid until 1900 CDT. The advisory included Butler County, which included the city of Greenville, Alabama. The initial radar image and counties under Tornado Watch 285 is included as figure 16 followed by the public text of the advisory.

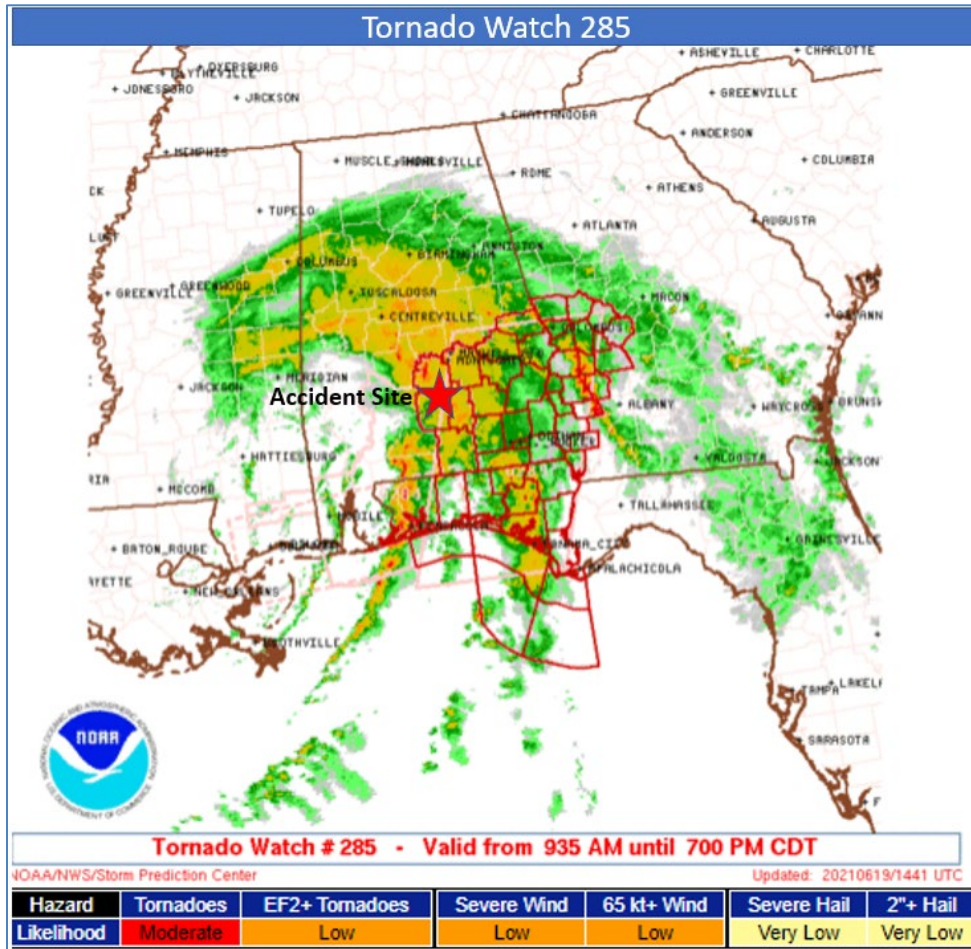


Figure 13 - Tornado Watch 285 issued at 0935 CDT

URGENT - IMMEDIATE BROADCAST REQUESTED
Tornado Watch Number 285
NWS Storm Prediction Center Norman OK
935 AM CDT Sat Jun 19 2021

The NWS Storm Prediction Center has issued a

** Tornado Watch for portions of*
Southeast Alabama

¹² A Tornado Watch means conditions are favorable for the development of severe thunderstorms and tornadoes in or near the watch area and are issued by the NWS Storm Prediction Center. While a Tornado Warning means that a tornado has been sighted or indicated by weather radar, and imminent danger to life or property. Warnings are issued by the regional NWS Weather Forecast office.

*Florida Panhandle
Southwest Georgia
Coastal Waters*

** Effective this Saturday morning and evening from 935 AM until
700 PM CDT.*

** Primary threats include...
A few tornadoes possible
Isolated damaging wind gusts to 70 mph possible*

*SUMMARY...Scattered thunderstorms associated with Tropical Storm Claudette will pose a risk of brief
tornadoes and damaging winds through the afternoon across the watch area.*

*The tornado watch area is approximately along and 60 statute miles east and west of a line from 10 miles
east of Auburn AL to 45 miles southwest of Panama City FL. For a complete depiction of the watch see the
associated watch outline update (WOUS64 KWNS WOU5).*

PRECAUTIONARY/PREPAREDNESS ACTIONS...

*REMEMBER...A Tornado Watch means conditions are favorable for tornadoes and severe thunderstorms
in and close to the watch area. Persons in these areas should be on the lookout for threatening weather
conditions and listen for later statements and possible warnings.*

OTHER WATCH INFORMATION...CONTINUE...WW 284...

*AVIATION...Tornadoes and a few severe thunderstorms with hail surface and aloft to 0.5 inches. Extreme
turbulence and surface wind gusts to 60 knots. A few cumulonimbi with maximum tops to 500. Mean storm
motion vector 18035.*

...Hart

The advisory expired at 1900 CDT with no Tornado or Severe Thunderstorm Warnings being issued for the city of Greenville or Butler County during the period. The Mobile NWS WFO did issue Tornado Warnings for southwest Alabama for the Mobile County for the Dauphin Island area, Baldwin County for the Orange Beach area, Escambia County for northwestern Florida, Covington County.

8.4 Local Storm Reports

A review of the NWS Local Storm Reports (LSR) from Mobile WFO is provided in graphic form is included as figure 17, with the approximate accident site marked by a red star. A total of 5 tornadoes were reported in southern Alabama and 3 in the Florida Panhandle on June 19, 2021, associated with Tropical Storm Claudette, as well as numerous Flash Flooding reports over the coastal sections of Mississippi, Alabama, and the Florida Panhandle. No severe weather reports for road flooding were noted in Butler County other than the highway accident documented in this report.

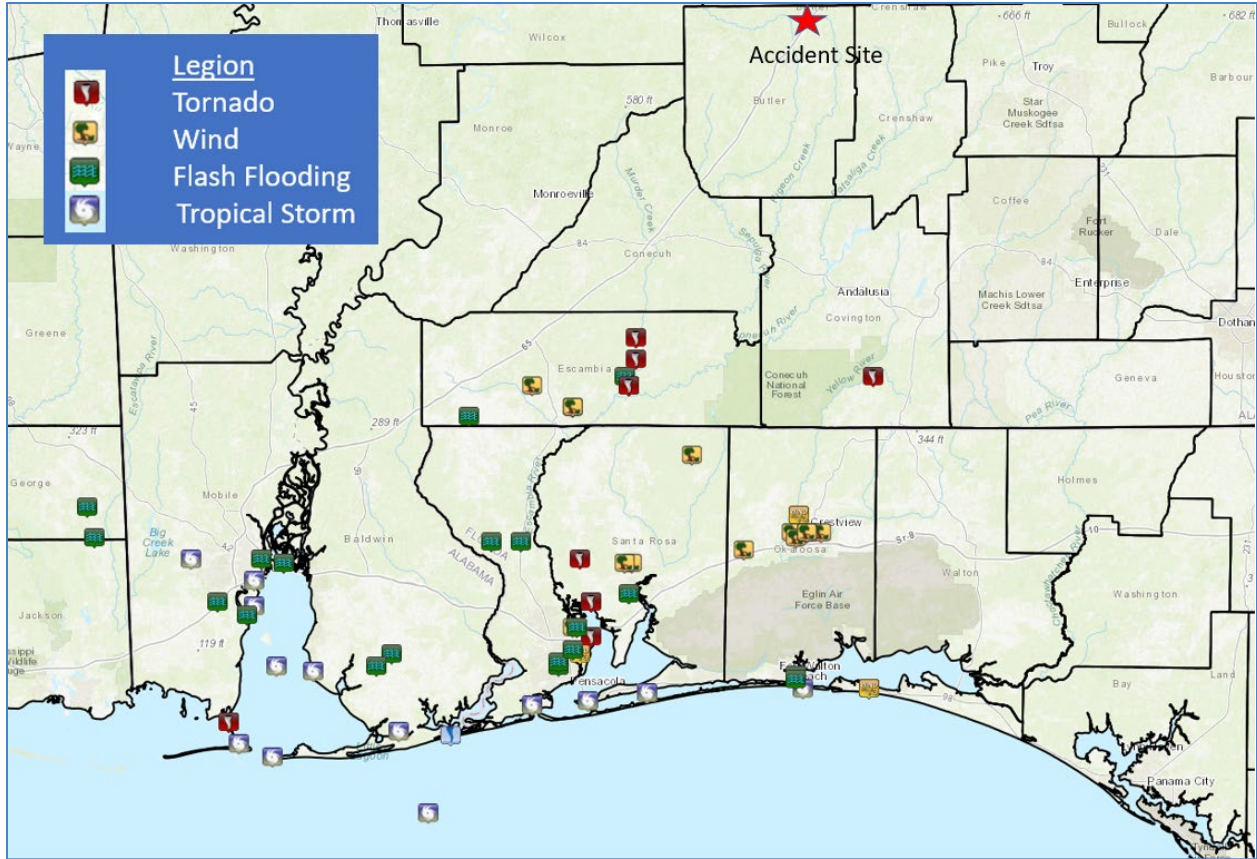


Figure 14 - NWS KMOB WFO Local Storm Reports for June 19, 2021

The Local Storm Reports (LSR) issued by the NWS Mobile WFO were as follows for June 19, 2021.

Time	Event	City	County, State	Lat./Lon.	Remarks
0315	Tropical Storm	2 NNE Gulf Shores	Baldwin, AL	30.29N 87.68W	KJKA ASOS reports 44 mph wind gust
0315	Tornado	4 SSW Alabama Port	Mobile, AL	30.31N 88.14W	Mobile County 911 reported a tornado hit the Cedar Point Fishing Pier located at 18250 Dauphin Island Parkway. One possible injury.
0330	Flash Flood	2 WNW Whites Crossing	Stone, MS	30.86N 89.08W	Water covering roadways at intersection of Big Four & Marshal Taylor Rd.
0400	Tropical Storm	Dauphin Island	Mobile, AL	30.26N 88.11W	Dauphin Island reports sustained wind 41 mph gusting 46 mph.
0400	Tropical Storm	Fort Morgan	Baldwin, AL	30.23N 88.02W	Fort Morgan reports sustained winds 49 mph gusting 53 mph.
0430	Tropical Storm	6 WSW Point Clear	Gulf of Mexico, AL	30.44N 88.01W	Middle Bay Light gust to 43 mph.
0431	Tropical Storm	2 SSW Brookley Field	Mobile, AL	30.58N 88.07W	Buccaneer Yacht Club reports wind gust to 49 mph.

0442	Tropical Storm	Brookley Field	Mobile, AL	30.64N 88.07W	KBFM ASOS gust to 46 mph.
0500	Flash Flood	Agricola	Georgia, MS	30.81N 88.52W	Flooded roads in Agricola, MS.
0515	Tropical Storm	70 SSE Fort Morgan	Gulf of Mexico, AL	29.23N 87.78W	KVOA ASOS gust to 60 mph.
0550	Tropical Storm	12 S Romar Beach	Gulf of Mexico, AL	30.10W 87.60W	Buoy 42012 gust to 42 mph.
0556	Waterspout	3 E Orange Beach	Gulf of Mexico, AL	30.28N 87.54W	Waterspout 1 mile east of Perdido Pass and 1 mile west of Flora Bama.
0606	Tropical Storm	1 NNW Mobile Regional	Mobile, AL	30.69N 88.24W	KMOB ASOS 49mph gust.
0638	Tropical Storm	Gulf Breeze	Santa Rosa, FL	30.36N 87.17W	Gulf Breeze Co-Op station reports 60 mph wind gust.
0640	Tropical Storm	5 E Oriole Beach	Gulf of Mexico, FL	30.38N 87.01W	MESONET Santa Rosa Sound DB127 gust 71 mph
0640	Flash Flood	2 E Pinto Island	Baldwin, AL	30.68N 87.99W	Water covering roadway causeway EB at I-10 Bayway. Right lane flooded.
0646	Tropical Storm	Pensacola	Escambia, FL	30.35N 87.32W	KPNS ASOS gust to 81 mph.
0648	Tropical Storm	Pensacola NAS	Escambia, FL	30.35N 87.32W	KNAP ASOS reports 51mph wind gust
0648	TSTM Wind Gust	1 N Ferry Pass	Escambia, FL	30.53N 87.21W	Fire Dept reports trees on homes, buildings damage, multiple light poles down.
0648	Tornado	1 SSW Pace	Santa Rosa, FL	30.59N 87.16W	Santa Rosa 911 call of tornado reported 1 SSW Pace. Structural damage reported and multiple trees and utility lines down.
0650	Tornado	3 NE Pensacola Intl Airport	Escambia, FL	30.51N 87.16W	18-wheeler overturned on eastbound I-10 Escambia Bay Bridge.
0652	Tornado	6 NWW Pace	Santa Rosa, FL	30.69N 87.19W	Tornado confirmed by public and law enforcement. 5-6 buildings damaged. No injuries reported.
0710	Tropical Storm	3 S Point Clear	Baldwin, AL	30.43N 87.91W	Crabshack Mesonet site gust 50 mph
0735	Tornado	1 SE East Brewton	Escambia, AL	31.09N 87.06W	Emergency Manager reports 15-20 injured by tornado that touched down in East Brewton, AL. Most minor, with 2 serious injuries. Significant damage to structures in area. NWS Storm Survey Team reported EF-2 tornado with peak wind 127 mph and a track of 22 miles.
0736	TSTM Wind Gust	4 SE Sardine	Escambia, AL	31.09N 87.32W	Flomation Fire Dept reports large tree down blocking Upper Creek Rd.
0740	Tornado	3 S Kirkland	Escambia, FL	31.15N 87.04W	Brewton Fire Dept reported trailer flipped over on Sam's Lane, no injuries.

0805	TSTM Wind Gust E59 mph	2 NW Crestview	Okaloosa, FL	30.79N 86.60W	Mesonet site Old Bethel Rd
0810	Flash Flood	2 WNW Whites Crossing	Stone, MS	30.86N 89.08W	Water covering roadways at intersection of Big Four & Marshal Taylor Rd.
0830	Flash Flood	1 S Summerdale	Baldwin, AL	30.47N 87.70W	Water covering roadway at intersection of 59 & CR32.
0900	Flash Flood	1 ENE Hollingers Island	Mobile, AL	30.56N 88.09W	Law Enforcement reports road closure on Dauphin Island Parkway & Marina Dr due to water covering road.
0900	Flash Flood	Tillmans Corner	Mobile, AL	30.59N 88.17W	Mobile Police report calls of water covering roads at Halls Mill Rd & HWY 90 intersection.
1000	Flash Flood	3 NE Magnolia Springs	Baldwin, AL	30.44N 87.74W	Flash Flooding reported on CR55 West of Foley, just north of the intersection with Underwood Rd.
1001	Flash Flood	Atmore	Escambia, AL	31.02N 87.49W	Water over Main St in Atmore, AL.
1038	Flash Flood	Brewton	Escambia, AL	31.11N 87.07W	Spotter reports many roads in town flooded and closed. Some roads with swift current, but only ~2inches some places.
1101	Flash Flood	1 NNE Ferry Pass	Escambia, FL	30.53N 87.20W	High water over roadways has resulted in road closures on Copter Rd & Ely Rd, in Ferry Pass, FL.
1101	Flash Flood	1 N Brownsville	Escambia, FL	30.44N 87.25W	Market St at W. Fairfield Dr in Brent, FL is closed due to high water over road.
1113	Flash Flood	1 WSW Pensacola International Airport	Escambia, FL	30.48N 87.21W	Flooding at 9 th Ave & College BLVD in Pensacola.
1129	Flash Flood	2 N Barrineau Park	Escambia, FL	30.73N 87.43W	Flash Flooding off HWY 99 in Molino, FL.
1142	TSTM Wind Damage	2 WSW Galliver	Okaloosa, FL	30.71N 86.75W	Large tree down blocking Rd on Log Lake Rd and US HWY 90W.
1227	Flash Flood	2 WNW Bagdad	Santa Rosa, FL	30.61N 87.06W	US-90 @ Glover LN in Milton, FL, closed due to water over roadway.
1228	Tropical Storm	3 SE Fort Walton Beach	Gulf of Mexico, FL	30.39N 86.59W	MESONET Weatherflow site at Okloosa Island Fishing Pier sustained 39 mph gust 49 mph.
1312	Tornado	2 ENE Watkins Bridge	Covington, AL	31.11N 86.40W	NWS Storm Survey determined that brief EF-0 tornado touched down south of North Creek Rd, numerous large trees down.
1338	Flash Flood	2 WNW Molino	Escambia, FL	30.73N 87.35W	Water flowing over roadway near HWY-29 and Crabtree Church Rd.
1510	Coastal Flood	1 E West End Dauphin Island	Mobile, AL	30.25N 88.18W	Bienville BLVD from Surf CT West currently underwater and closed.

1539	Flash Flood	1 WSW Downtown Mobile	Mobile, AL	30.69N 88.05W	Road closure due to flooding from Government St to Broad St.
1546	Flash Flood	1 ESE Fort Walton Beach	Okaloosa, FL	30.42N 86.61W	Water covering roadway at intersections of Walter Martin Rd NE and Carson Dr NE.
1549	Flash Flood	1 SE Fort Walton Beach	Okaloosa, FL	30.41N 86.61W	Law Enforcement reports current flooding on Harbeson Ave SE.
1722	Coastal Flooding	2 S Bayou	Bayou La Batre, AL	30.38N 88.24W	Law Enforcement reports coastal flooding on Shell Belt Rd and Coden Belt Rd.
1845	TSTM Wind Gust	5 ESE Destin	Okaloosa, FL	30.39N 86.41W	XCBS Mesonet station on Crystal Beach reported wind gust 41 mph.

There was no record or report for flooding in the vicinity of Greenville or Butler County on June 19, 2021.

9.0 Astronomical Conditions

The United States Naval Observatory (USNO) Multiyear Interactive Computer Almanac (MICA) software program provided the following astronomical conditions for Greenville on June 19, 2021. Time has been rounded to the nearest minute, and the time of the accident has been added for reference in bold italic type.

<u>Sun</u>	<u>Time (CDT)</u>
Begin civil twilight	0512
Sunrise	0540
Sun Transit	1247
<i>Accident</i>	<i>1422</i>
Sunset	1955
End civil twilight	2023

At the time of the accident the Sun was approximately 67° above the horizon at an azimuth of 254°.

E. LIST OF ATTACHMENTS

Attachment 1 - NWS Local Climatological Data – Daily Summary and Hourly Observation Logs for Greenville Mac Crenshaw Memorial Airport.

Submitted by:

Don Eick
Senior Meteorologist