



Aviation Investigation Final Report

Location:	Bishop, Georgia	Accident Number:	ERA20FA118
Date & Time:	March 3, 2020, 16:34 Local	Registration:	N43368
Aircraft:	Piper PA46	Aircraft Damage:	Destroyed
Defining Event:	Loss of control in flight	Injuries:	3 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot departed on an instrument flight rules cross-country flight with three passengers. While enroute at a cruise altitude about 6,000 ft mean sea level (msl), the pilot discussed routing and weather avoidance with the controller. The controller advised the pilot there was a gap in the line of weather showing light precipitation, and that the pilot could pass through it and then proceed on course.

The controller assigned the pilot a heading, which the pilot initially acknowledged, but shortly thereafter, he advised the controller that the airplane was pointed directly at a convective cell. The controller explained that the heading would keep the pilot out of the heavy precipitation and that he would then turn the airplane through an area of light precipitation. The pilot responded, saying that the area seemed to be closing in fast, the controller acknowledged and advised the pilot if he did not want to accept that routing, he could be rerouted. The pilot elected to turn toward a gap that he saw and felt he could fly straight through it. The controller acknowledged and advised the pilot that course would take him through moderate precipitation starting in about one mile extending for about four miles; the pilot acknowledged.

Radar information indicated that the airplane entered an area of heavy to very heavy precipitation, likely a rain shower updraft, while in instrument meteorological conditions, then entered a right, descending spiral and broke up in flight.

Examination of the wreckage revealed no evidence of a preaccident malfunction or failure that would have prevented normal operation.

The airplane was equipped with the capability to display weather radar "mosaic" imagery created from Next Generation Radar (NEXRAD) data and it is likely that the pilot was using this information to navigate around precipitation when the airplane encountered a rain shower

updraft with likely severe turbulence. Due to latencies inherent in processes used to detect and deliver the NEXRAD data from the ground site, as well as the frequency of the mosaic-creation process used by the service provider, NEXRAD data can age significantly by the time the mosaic image is created. The pilot elected to navigate the hazardous weather along his route of flight based on the data displayed to him instead of the routing suggested by the controller, which resulted in the penetration of a rain shower updraft, a loss of airplane control, and a subsequent inflight breakup.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's encounter with a rain shower updraft and severe turbulence, which resulted in a loss of airplane control and an inflight breakup. Contributing to the accident was the pilot's reliance on outdated weather information on his in-cockpit weather display.

Findings

Personnel issues	Aircraft control - Pilot
Personnel issues	Use of available resources - Pilot
Aircraft	(general) - Capability exceeded
Environmental issues	(general) - Contributed to outcome
Environmental issues	(general) - Timing of related info
Environmental issues	(general) - Decision related to condition
Environmental issues	(general) - Availability of related info

Factual Information

History of Flight

Enroute-cruise	Loss of control in flight (Defining event)
Enroute	Part(s) separation from AC

HISTORY OF FLIGHT

On March 3, 2020, about 1634 eastern standard time, a Piper PA-46-310P, N43368, was destroyed when it was involved in an accident near Bishop, Georgia. The private pilot and two passengers were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot filed an instrument flight rules (IFR) flight plan and contacted air traffic control shortly after departure from Columbia Metropolitan Airport (CAE), Columbia, South Carolina. A review of the ATC communications and radar data provided by the Federal Aviation Administration (FAA) revealed that the airplane was on a westerly track from CAE about 6,000 ft mean sea level (msl) enroute to Tuscaloosa Regional Airport (TCL), Tuscaloosa, Alabama. The pilot contacted the Atlanta approach controller 1613 and was provided the current altimeter. The controller also broadcast AIRMETS for IFR conditions and mountain obscuration, turbulence, and icing.

About 1616, the controller advised the pilot that he would need to go north or south around Atlanta. The pilot first asked the controller to stand by, then a few seconds later advised north, and that he could go higher as well. The controller issued a new clearance to the pilot, two intersections on the north side of Atlanta, then direct to TCL.

About 1621, the pilot requested to deviate left for weather. The controller approved the request and advised the pilot that he would be past the line of weather in about 15 to 20 miles. About 1629, the controller advised the pilot there was a gap in the line of weather in about 8 miles with light precipitation, that he would turn him north to get through it, and once north of the weather, the pilot could proceed on course.

About 1630, the controller instructed the pilot to fly heading 300°. The pilot acknowledged at first, then a few seconds later, the pilot advised that the given heading was pointing him "straight into a buildup." The controller explained that he would be keeping the pilot south of the heavy precipitation and then would turn the pilot north through the line where there was currently about 3 miles of light precipitation. The pilot responded, saying that the area seemed to be closing in fast. The controller acknowledged and advised the pilot that if that plan would not work, he would need to turn the pilot due south and take the pilot well south around

Atlanta. The pilot responded saying that he would turn north. The controller advised the pilot to fly heading 300° and that would keep him out of the moderate precipitation. The pilot stated, "I thought I was gonna shoot this gap here, I got a gap I can go straight through." The controller acknowledged and advised that was fine if it looked good to the pilot, but that the controller was showing moderate precipitation starting in about 1 mile extending for about 4 miles northbound; the pilot acknowledged.

About 1633, the controller asked the pilot what his flight conditions were, and the pilot responded, "rain three six eight." There were no further transmissions from the pilot.

A witness about 1/2 mile from the accident site stated there were scattered rain showers in the area, the base of the clouds was about 2,500 to 3,000 ft, and there was no lightning or thunder. He heard the engine noise first, then saw the airplane spinning toward the ground in a nose-low attitude until it disappeared from sight. He did not believe the airplane was under control at any point and did not see any parts separate from the airplane. He arrived on scene a few minutes later, and reported that the fuselage was directly below where he saw the airplane spinning and it was engulfed in flames.

Another witness stated that he heard the airplane, turned and looked up to see the airplane tilted left and the nose pointed towards the ground. He saw the airplane for a few seconds; it was about 150 ft above his head and spun once or twice. He believed that both wings were attached, and he did not see anything come off the airplane. He heard the engine revving up and down, then heard a loud crash. He drove over to the area where he saw the airplane disappear behind trees and said he had never seen it rain harder than it did right after the accident.

One witness was outside and heard a loud noise. He looked up and saw part of a wing and debris falling from the sky. The airplane was on fire when he arrived on scene.

Another witness heard "an explosion, sounded like an implosion or contained in a metal can" and heard the engine rev up momentarily. He turned and saw the airplane engulfed in black smoke before it disappeared behind the tree line. He also saw two or three similarly shaped rectangular portions of the airplane, one with a slight amount of smoke coming off it.

METEOROLOGICAL INFORMATION

The pilot did not receive a weather briefing before the accident, but did request weather information through ForeFlight Mobile, which included warnings for thunderstorm and heavy rain shower activity in the vicinity of the accident site. The airplane was equipped with XM and Flight Information Services–Broadcast (FIS-B) weather information. The pilot would have access to XM weather composite radar images and FIS-B weather radar imagery.

Radar returns from the airplane ended near the western edge of an east-west oriented line of rain showers. The flight track data showed that the airplane had remained about 10 to 20 miles south of the line of weather after departing CAE until turning into the cell of rain showers.

The accident site was located in a warm air sector ahead of a cold front. A low- and mid-level trough was immediately east of the accident site, having moved through hours earlier. Troughs can act as lifting mechanisms to help produce clouds and precipitation if sufficient moisture is present. The Storm Prediction Center (SPC) issued a Convective Outlook at 1456 with areas of marginal risk for severe thunderstorms forecast for the accident site. Satellite imagery at 1630 and 1640 indicated an extensive layer of cloud cover above the accident site that was cumuliform in nature. Approximate cloud tops over the accident site at 1640 were about 22,000 ft msl.

Consolidated Storm Prediction for Aviation (CoSPA) images were retrieved for 1620, 1625, 1630, and 1635. The data showed an area of growing rain showers moving west to east above the accident site with cloud tops at 28,000 ft msl. The CoSPA indicated an area of rain shower growth from 1630 onward.

Weather radar reflectivity values located above the accident site at the time of the accident were indicative of heavy to very heavy precipitation. The band of rain showers was moving southeastward with time and the "gaps" in the rain shower band were filling as more rain showers developed between 1614 and 1634.

The controller issued two PIREPs to the pilot from other airplanes that had gone in between the rain shower line preceding the accident airplane. The XM weather information and comparison with Weather Surveillance Radar-1988, Doppler (WSR-88D) data indicated that best case scenario for XM weather imagery viewability before the pilot turned north at 1630 had a time stamp of 1624 and there was a difference of between 6 to 12 minutes from when the weather radar scan was initiated.

WRECKAGE AND IMPACT INFORMATION

The airplane impacted a wooded area behind a residential property at an elevation of 760 ft msl. The main wreckage was oriented on a magnetic heading of 090°. All major components were accounted for at the scene. The main wreckage consisted of the fuselage and engine. The wings, empennage, and airframe components were located along the ½-mile-long debris path. The right side of the fuselage was destroyed by a postimpact fire. The primary flight control cables were traced from the cockpit area to their respective flight control surfaces through impact and overload separation areas.

A borescope was utilized to examine the engine cylinders; all intake and exhaust valves were intact. Crankshaft and valve continuity were confirmed from the front to the rear of the engine. Both magnetos were rotated through the impulse coupling and exhibited a spark on all lead outputs. The two-bladed propeller remained attached to the engine; both blades were free of leading edge gouges or chordwise scratches.

The postaccident examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation.

ADDITIONAL INFORMATION

Weather radar mosaic imagery from Next Generation Radars (NEXRAD) is available to pilots in the cockpit via FIS-B and private satellite weather vendors. A mosaic presents radar data from multiple radar ground sites on a single image. Data from individual ground sites may not be updated with each new mosaic image. The age indicator displayed to the pilot in the cockpit is not the age of the actual weather conditions as detected by the NEXRAD system. Instead, the age indicator refers to the age of the mosaic that is created by the service provider. The actual age of the oldest weather conditions is always older than the age indication on the display.

Due to latencies inherent in processes used to detect and deliver the NEXRAD data from the ground site, as well as the frequency of the mosaic-creation process used by the service provider, the NEXRAD data can age significantly by the time the mosaic image is created. Although not believed to be typical, in extreme latency and mosaic-creation scenarios allowed by the service provider, the actual age of the oldest NEXRAD data on the display can exceed the age in the cockpit by up to 15 minutes for satellite weather and 20 minutes for FIS-B.

The accident pilot had a valid subscription to XM data and a Garmin GMX-200, which would support XM data, was found in the airplane. The XM data was a weather radar service provided by XM Sirius and displayed on the Garmin GMX-200. The Garmin GMX-200 Pilot's Guide states, "This software is not designed or intended for use or resale in hazardous environments requiring fail-safe performance, such as aircraft navigation."

Pilot Information

Certificate:	Private	Age:	62, Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Unknown
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 3 With waivers/limitations	Last FAA Medical Exam:	September 30, 2019
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	(Estimated) 1178.7 hours (Total, all aircraft)		

Passenger Information

Certificate:		Age:	67, Male
Airplane Rating(s):		Seat Occupied:	Unknown
Other Aircraft Rating(s):		Restraint Used:	
Instrument Rating(s):		Second Pilot Present:	No
Instructor Rating(s):		Toxicology Performed:	
Medical Certification:		Last FAA Medical Exam:	
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:			

Passenger Information

Certificate:		Age:	65, Male
Airplane Rating(s):		Seat Occupied:	Unknown
Other Aircraft Rating(s):		Restraint Used:	
Instrument Rating(s):		Second Pilot Present:	No
Instructor Rating(s):		Toxicology Performed:	
Medical Certification:		Last FAA Medical Exam:	
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:			

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	Registration:	N43368
Model/Series:	PA46 310P	Aircraft Category:	Airplane
Year of Manufacture:	1984	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	46-8408028
Landing Gear Type:	Retractable - Tricycle	Seats:	6
Date/Type of Last Inspection:	Unknown	Certified Max Gross Wt.:	4101 lbs
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:		Engine Manufacturer:	Continental
ELT:	Installed, not activated	Engine Model/Series:	TSIO-520 SER
Registered Owner:		Rated Power:	310 Horsepower
Operator:	On file	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	Condition of Light:	Day
Observation Facility, Elevation:	AHN,813 ft msl	Distance from Accident Site:	
Observation Time:	16:06 Local	Direction from Accident Site:	
Lowest Cloud Condition:		Visibility	10 miles
Lowest Ceiling:	Broken / 2500 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	8 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	300°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:		Temperature/Dew Point:	18°C / 15°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Columbia, SC (CAE)	Type of Flight Plan Filed:	IFR
Destination:	Tuscaloosa, AL (TCL)	Type of Clearance:	IFR
Departure Time:	15:29 Local	Type of Airspace:	Air traffic control

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	2 Fatal	Aircraft Fire:	On-ground
Ground Injuries:		Aircraft Explosion:	None
Total Injuries:	3 Fatal	Latitude, Longitude:	33.856666,-83.486389(est)

Preventing Similar Accidents

In-Cockpit NEXRAD Mosaic Imagery

Weather radar "mosaic" imagery created from Next Generation Radar (NEXRAD) data is available to pilots in the cockpit via the flight information service-broadcast (FIS-B) and private satellite weather service providers. A mosaic image presents radar data from multiple radar ground sites on a single image on the cockpit display. When a mosaic image is updated, it may not contain new information from each ground site. The age indicator associated with the mosaic image on the cockpit display **does not** show the age of the actual weather conditions as detected by the NEXRAD network. Instead, the age indicator displays the age of the mosaic image created by the service provider. Weather conditions depicted on the mosaic image will **ALWAYS be older than the age indicated on the display**. Due to latencies inherent in processes used to detect and deliver the NEXRAD data from the ground site to the service provider, as well as the time intervals used for the mosaic-creation process set by the service provider, NEXRAD data can age significantly by the time the mosaic image is created.

Although such situations are not believed to be typical, in extreme latency and mosaic-creation scenarios, the actual age of the oldest NEXRAD data in the mosaic can **EXCEED** the age indication in the cockpit by **15 to 20 minutes**. Even small time differences between the age indicator and actual conditions can be important for safety of flight, especially when considering fast-moving weather hazards, quickly developing weather scenarios, and/or fast-moving aircraft. The general issue of latency with in-cockpit NEXRAD is discussed in pilots' guides, in industry literature, and on service providers' websites. However, the NTSB has not found that such guidance contains details about the potential time difference between the age indicator and actual conditions.

Remember that the in-cockpit NEXRAD display depicts where the weather **WAS**, not where it **IS**. The age indicator does not show the age of the actual weather conditions but rather the age of the mosaic image. The common perception of a "5-minute latency" with radar data is not always correct. You should consider the potential delay, which may be up to 15 to 20 minutes, when using in-cockpit NEXRAD capabilities, as the movement and/or intensification of weather could adversely affect safety of flight.

Having in-cockpit weather capabilities does not circumvent the need for a complete weather briefing **before** takeoff. Further, pilots should use all appropriate sources of weather information to make in-flight decisions.

See http://www.nts.gov/safety/safety-alerts/documents/SA_017.pdf for additional resources.

The NTSB presents this information to prevent recurrence of similar accidents. Note that this should not be considered guidance from the regulator, nor does this supersede existing FAA Regulations (FARs).

Administrative Information

Investigator In Charge (IIC):	Hill, Millicent		
Additional Participating Persons:	Russell Layton; FAA/FSDO; Atlanta, GA Mike Council; CMI; Mobile, AL Damian Galbraith; Piper; Vero Beach, FL		
Original Publish Date:	December 20, 2022	Investigation Class:	3
Note:	The NTSB traveled to the scene of this accident.		
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=101024		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).