

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



DCA23FA428

AIR TRAFFIC CONTROL

Group Chair's Factual Report

November 24, 2023

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A. ACCIDENT

Location: Atlanta, Georgia
Date: August 29, 2023
Time: 1831 eastern daylight time (EDT)
2231 coordinated universal time (UTC)
Airplane: Airbus SAS A350-941, N576DZ, Delta Air Lines flight 175 (DAL175)

B. AIR TRAFFIC CONTROL GROUP

Group Chair	Michael Brown Operational Factors (AS-30 / ATC) National Transportation Safety Board (NTSB) Washington, DC
Specialist - ATC	Brian Soper Operational Factors (AS-30 / ATC) National Transportation Safety Board (NTSB) Washington, DC
Group Member	Louis Hancock ATC Subject Matter Expert Federal Aviation Administration (FAA) Jacksonville, FL
Group Member	Seth Myers Air Safety Investigator National Air Traffic Controllers Association (NATCA) Boston, MA
Group Member	Brian Swain Senior Air Traffic Manager Delta Air Lines Atlanta, GA

C. SUMMARY

On August 29, 2023, about 1831 eastern daylight time, Delta Air Lines (DAL) flight 175, an Airbus A350-941, encountered convective turbulence during descent into Hartsfield Jackson International Airport (ATL), Atlanta, Georgia. Of the 14 crew and 151 passengers onboard, 2 crew and 2 passengers sustained serious injuries, and 8 crew and 5 passengers sustained minor injuries. The aircraft sustained minor damage. DAL175 was a 14 *Code of Federal Regulations (CFR)* Part 121 scheduled international passenger flight from Milan Malpensa Airport (MXP), Milan, Italy to ATL.

The air traffic control (ATC) facilities involved in this accident were the Atlanta Air Route Traffic Control Center (ZTL ARTCC) and Atlanta Terminal Radar Approach Control (A80 TRACON).

D. DETAILS OF THE INVESTIGATION

On August 30, 2023, the ATC work group was formed and included two ATC investigators from AS-30, an ATC subject matter expert (SME) from the FAA, air safety investigator (ASI) from NATCA, and a SME from Delta Air Lines. Notification was made to the FAA advising our intent to conduct on-site investigative work at ZTL ARTCC. The FAA was provided a list of personnel that the group requested to interview and advised that all interviews would be recorded and provided for transcription in accordance with normal NTSB procedure.

On September 5, 2023, the group arrived in the Atlanta area but did not conduct any investigative or group activities.

On September 6, 2023, the group held a brief organizational meeting at the hotel then traveled to ZTL ARTCC and conducted an in-brief with the Air Traffic Manager (ATM) and other members of their staff. Also present at the in-brief were members from the FAA's Safety Intelligence and Response Group (SIRG), Eastern Service Area Quality Control Group (ESA QCG), and office of Chief Counsel. The group was provided with an operational tour of the ARTCC control floor with a focus on Area 3 and the Logen radar sector (R49) position (the involved position)¹. The group was also provided with an ERAM² playback so the group could observe exactly what was available on the involved controller's display at the time of the event.³ The group then conducted interviews with the Traffic Management Coordinator (TMC) that signed on just after the event had occurred and the R49 controller that was providing services until just before the time of the accident that occurred shortly after completing a handoff to Atlanta Terminal Radar Approach Control (A80 TRACON).⁴

On September 7, 2023, the group returned to ZTL ARTCC, reviewed data, and conducted interviews with the Operations Supervisor (OS) and Operations Manager (OM) that were working at the time of the accident, as well as the Quality Control Manager (QCM). After review of additional data and documentation, the group concluded on-site activities for the day.

¹ A photo array of photographs documenting the pertinent ZTL ARTCC workstations and associated equipment are included in Attachment 1: Photo Array - ZTL ARTCC Control Room

² ERAM - En Route Automation Modernization - The Next Gen system designed to replace the En Route Host and backup system previously utilized at Air Route Traffic Control Centers and allows for faster processing of route requests and in-flight route changes.

³ A photo array of photographs taken of the R49 position ERAM playback are included in Attachment 2: Photo Array - ZTL ARTCC ERAM Playback

⁴ All interviews were recorded then transcribed by Free State Reporting and transcripts are included in Attachment 3: Interview Transcripts.

On September 8, 2023, the group returned to ZTL ARTCC, conducted an interview with the Traffic Management Officer (TMO) for the Atlanta District, reconciled requested/received data, and concluded the on-scene work at the ARTCC. The group then returned to the hotel and completed the group field notes, obtained concurrence, and concluded the ATC field investigation.

E. FACTUAL INFORMATION

1.0 History of Flight

The following timeline was constructed from certified audio recordings and automatic dependent surveillance - broadcast (ADS-B)⁵ data were provided by the FAA⁶. Times are in EDT and altitudes below 18,000 feet are in feet above mean sea level (msl), and altitudes of 18,000 feet or greater are in flight levels (FL)⁷.

[ADS-B data indicated that DAL175 departed Milano/Malpensa Airport (MXP) over nine hours earlier and flew without incident before checking in with ZTL ARTCC. The following documents only the portion of the flight when DAL175 was in communication with ZTL ARTCC and A80 TRACON.]

1820:13 The crew of DAL175 first contacted ZTL ARTCC and was instructed by the R49 controller to maintain FL 220. The crew acknowledged with a correct readback.

1826:19 The crew of DAL175 queried the R49 controller regarding a CPDLC⁸ instruction. The R49 controller instructed the crew to disregard, maintain 310 knots or better, descend and cross OZZZ⁹ at 14,000 feet, and provided the altimeter of 29.82. The crew acknowledged with a correct readback.

⁵ Automatic Dependent Surveillance-Broadcast (ADS-B) – A surveillance system in which an aircraft or vehicle to be detected is fitted with cooperative equipment in the form of a data link transmitter. The aircraft or vehicle periodically broadcasts its GPS-derived position and other information such as velocity over the data link, which is received by a ground-based transmitter/receiver (transceiver) for processing and display at an air traffic control facility.

⁶ A partial transcript of the ATC audio is included in Attachment 4: ATC Audio Partial Transcript, and certified ADS-B data is included in Attachment 5: ADS-B Data.

⁷ Flight Level (FL) – A level of constant atmospheric pressure related to a reference datum of 29.92 inches of mercury. Each is stated in three digits that represent hundreds of feet. For example, flight level (FL) 250 represents a barometric altimeter indication of 25,000 feet; FL 255, an indication of 25,500 feet.

⁸ Controller Pilot Data Link Communications (CPDLC) – A two-way digital communications system that conveys textual air traffic control messages between controllers and pilots using ground or satellite-based radio relay stations.

⁹ A navigational airspace fix located near Thompsons Mill, Georgia.

- 1827:06 The crew of DAL175 requested to deviate left around weather. The controller requested they maintain "*pointed at*" OZZZI, and that they could expect vectors from A80 TRACON. The crew acknowledged.
- 1829:54 The crew of SWA4825 [a few miles in-trail of DAL175] asked how the rides were and the R49 controller advised he had received no complaints and that they could expect more information from approach when they were closer. The pilot mentioned they were looking at the "*towering [indiscernible]*" in front of them and they may have to slow down.
- 1830:15 The R49 controller queried DAL175 about how their ride was through 17,000 feet. The crew said it was good but about to get worse and that there was a cloud up ahead. The R49 controller instructed the crew to contact approach.
- 1831:26 The crew of DAL175 checked in with the A80 TRACON RA controller and reported out of 15,000 feet for 14,000 feet. The RA controller instructed DAL175 to descend and maintain 12,000 feet. The crew acknowledged with a correct readback.
- 1832:13 The crew of SWA4825 checked in with the A80 TRACON RA controller and advised they were slowing to 280 knots for weather and that they were getting ready to enter clouds.
- 1832:33 The crew of DAL175 advised the radar controller that they had just "*hit a pretty good bump*" over OZZZI and that they would not want to go through that again. The controller asked the severity of turbulence and the crew reported "*it was pretty much severe.*"
- 1833:01 The RA controller immediately reached out to SWA4825 and advised them of the severe turbulence report from DAL175 and the crew of SWA4825 advised they had only experienced light to moderate through the same area.

[The remainder of the flight for DAL175 was uneventful, and the remainder of communications were routine landing information and the exchange of emergency information.]

2.0 Flight Track Surveillance Information

2.1 Automatic Dependent Surveillance - Broadcast

Certified ADS-B data was provided by the FAA. These data were provided in comma separated value (csv) format, as well as keyhole markup language (kml). The ADS-B data provided flight track surveillance information for the entire accident flight. Figures 1-3 in section F were produced from these data and overlaid onto satellite imagery in Google Earth.

3.0 Meteorological Information

An Automated Weather Observing System (AWOS)¹⁰ was located at the Gwinnett County Airport-Briscoe Field (LZU) in Lawrenceville, GA, and was about five nautical miles (nm) southwest of the reported accident location at an elevation of about 1,062 feet. The AWOS was augmented by LAWRS¹¹ certified tower weather observers. For detailed meteorological information see the Meteorology Factual Report in the public docket.

3.1 Surface Observations

The official observation issued at the approximate time of the turbulence event was as follows:

LZU weather observation at 2156Z, wind variable at 5 knots, visibility 10 miles or more, ceiling broken at 4,000 feet, temperature 31° Celsius (C), dew point temperature 24° C, altimeter 29.84 inches of mercury. Remarks: automated station with a precipitation discriminator, lightning detected distant south and southwest, sea-level pressure 1010.3-hPa, temperature 30.6° C, dew point 23.9° C.

The longline¹² observations that were disseminated on weather circuits and general flight categories were as follows (observation closest to incident time is in bold for emphasis):

MVFR METAR KLZU 292056Z 08004KT 10SM BKN028 31/23 A2983 RMK AO2 SLP099 T03060233 56027=

VFR SPECI KLZU 292103Z 11006KT 10SM CLR 31/23 A2983 RMK AO2=

VFR METAR KLZU 292156Z VRB05KT 10SM BKN040 31/24 A2984 RMK AO2 LTG DSNT S AND SW SLP103 T03060239=

VFR METAR KLZU 292256Z 12007KT 10SM VCTS CLR 29/24 A2983 RMK AO2 LTG DSNT S AND SW TSB51 SLP100 T02890239=

¹⁰ AWOS - Automated Weather Observing System is equipped with meteorological instruments to observe and report temperature, dewpoint, wind speed and direction, visibility, cloud coverage and ceiling up to 12,000 feet, and altimeter setting.

¹¹ LAWRS - Limited Aviation Weather Reporting Station - An airport weather station that utilized various degrees of automated sensors and/or other automated equipment (ie; AWOS) and is often augmented/backed up by certified tower weather observers at these locations.

¹² "Longline" refers to the dissemination of weather observations with the intent that they are available in near-real time to national databases (effectively, the whole world) and accessible to the general global public from a large number of vendors. This does not include public accessibility to observations from a reporting station's Very High Frequency (VHF; line-of-site) or telephone broadcast, where applicable. Longline dissemination of weather observations is the primary vehicle through which the general global public has access to surface weather observations, particularly outside of the aviation community.

3.2 In - Flight Weather Advisories

Convective SIGMET¹³ 17E was in effect from 2155 to 2255 UTC in the vicinity of the accident airplane's route of flight and reported area of turbulence encounter. Figure 4 in section F shows the graphical boundary of the SIGMET and below is the textual format as published by the National Weather Service (NWS):

```
WSUS31 KPCI 292155
SIGE
CONVECTIVE SIGMET 17E
VALID UNTIL 2355Z NC SC GA AND
NC FL SC GA CSTL WTRS
FROM 30WSW GSO-30SE ECG-70E CRG-10SSW PZD-ATL-30WSW GSO
AREA TS MOV FROM 18010KT. TOPS ABV FL450
```

3.3 Pilot Weather Reports

The following pilot weather reports (PIREPs) were reported within 150 miles of Atlanta up to the time of the accident. Routine PIREPs are coded with "UA" and urgent PIREPs with "UUA." The PIREP reported by accident flight is in bold for emphasis¹⁴.

ATL UA	OV ATL085040/TM2151/FL150/TP A320 / TB NEG/RM ZTLFD
MGM UA	OV 2W/TM 2202/FL010/TP CRJ7/WV +/- 15 KTS/RM DURGD
AHN UA	OV AHN140030/TM2213/FL380/TP MD11/SK TOP390/WX TS/RM ZTLFD
ATL UA	OV AUO180005/TM 2213/FL090/TP SR22/SK SCT 040
MGM UA	OV 5NM SW KALX/TM 2215/FL070/TP C130/RM LGT PRECIP
AGS UA	OV IRQ250025/TM 2220/FL210/TP B712/TB CONS MOD CAT/RM ZTLFD
LGC UA	OV LGC270025/TM 2229/FL270/TP BE20/TA M16/TB LGT-MOD CAT/IC LGT-MOD MX/RM ZTLFD
ATL UUA	OV ATL022021/TM 2235/FL140/TP A359/TB SEV/RM INJURIES REPORTED ON BOARD
AHN UA	OV AHN325010/TM 2314/FL150/TP A333/TB NEG/RM ZTLFD
AMG UA	OV AMG334021/TM 2320/FL080/TP BE58/SK BASE090/TB NEG/RM VMC SMOOTH AND CLEAR
PDK UA	OV PDK030003/TM 2353/FLDURGD/TP C560/RM + OR - 15K WIND SHEAR

¹³ SIGMET - Significant Meteorological Information - A weather advisory issued concerning weather significant to the safety of all aircraft. SIGMET advisories cover severe and extreme turbulence, severe icing, and widespread dust or sandstorms that reduce visibility to less than 3 miles.

¹⁴ Includes PIREPs disseminated longline and may not include "ride reports" or other reports made on radio frequency to air traffic control

4.0 Air Traffic Control Facility

ZTL ARTCC was a level 12 enroute air traffic control facility located in Hampton, GA, and part of the FAA's eastern service area.¹⁵ The radar facility covered approximately 129,000 square miles of airspace and bordered five other ARTCCs including Houston (ZHU), Jacksonville (ZJX), Washington (ZDC), Indianapolis (ZID), and Memphis (ZME). ZTL ARTCC operated 24-hours per day, 7-days per week.

The Logen Radar (R49) sector was the involved sector which, according to ZTL Order 7230.2Q, was located within area of specialization 3. The Logen sector was a low sector with altitude limits from 15,000 feet to FL 230 for the airspace overlying A80-Atlanta sector, from 13,000 feet to FL 230 for the airspace overlying Knoxville ATCT (TYS), and 11,000 feet to FL 230 for the remaining airspace. Logen is an inbound sector for Atlanta Terminal area arrivals from the northeast and is responsible for final spacing of aircraft to A80. Figure 5 in Section F shows the Logen sector's area of responsibility as outlined in ZTL Order 7230.2Q on the left, and a photograph of the corresponding R49 controller workstation on the right.

4.1 Air Traffic Control Personnel

At the time of the accident, Area 3 was staffed with ten Certified Professional Controllers (CPCs), one trainee, and one OS. There were five CPCs and one trainee on position, one CPC performing other duties, and four CPCs available, and additionally one OM on duty in the ARTCC. The R49 position was combined with the Commerce radar sector (R18) position. The OS was providing general supervision and had removed his cordless headset while coordinating with others in the facility.

The R49 controller, OS, and OM who were working leading up to the time of the accident, as well as the QCM and TMO were all interviewed, and information is provided below. Training documentation from TEAM¹⁶ was also reviewed for all of the involved controllers.¹⁷

¹⁵ Copies of pertinent logs and records from ZTL ARTCC are included in Attachment 6: ZTL ARTCC - Facility Logs and Records, and copies of pertinent procedural documentation are included in Attachment 7: ZTL ARTCC - Facility Procedural Documentation.

¹⁶ TEAM - Training Enterprise and Application Management - A cloud-based system that provides one consolidated electronic training admin solution to manage, record, and report ATC training data.

¹⁷ Pertinent training completion records reviewed from TEAM for involved controllers is included in Attachment 8: ZTL ARTCC - Controller Training Documentation.

4.2 Involved ATC Personnel

4.2.1 Traffic Management Coordinator

The TMC performing traffic management duties leading up to and at the time of the accident had been employed by the FAA in May 2002, and immediately began working at ZTL ARTCC. He had certified on TMC in September 2021.

He was 49 years old, held a current second-class medical clearance at the time of the accident and had received his last air traffic control physical on September 7, 2022. Neither post-accident drug nor alcohol testing were ordered or conducted, and he stated he had not taken any medications of any kind on the day of the accident. In the terms of excellent, good, fair, or poor; he described his health as excellent. His working hours for the week leading up to and including the day of the accident were:

Day	Date	Shift	Hours	Overtime
Wednesday	Aug 23	Day	0556-1356	None
Thursday	Aug 24	Day	0513-1313	None
Friday	Aug 25	Off	None	None
Saturday	Aug 26	Off	None	None
Sunday	Aug 27	Eve	1457-2257	None
Monday	Aug 28	Eve	1325-2125	None
Tuesday	Aug 29	Eve	1126-1956	None

4.2.2 Logen Sector Radar Controller

The R49 controller providing services at the time of the accident had been employed by the FAA in November 2012, and after initial training at the FAA academy began working at ZTL ARTCC in March 2013. He had certified on the R49 position in September 2015.

He was 35 years old, held a current second-class medical clearance and had received his last air traffic control physical on October 21, 2022. Neither post-accident drug nor alcohol testing were ordered or conducted, and he stated he had not taken any medications of any kind on the day of the accident. In the terms of excellent, good, fair, or poor; he described his health as excellent. His working hours for the week leading up to and including the day of the accident were:

Day	Date	Shift	Hours	Overtime
Wednesday	Aug 23	Eve	1345-2145	None
Thursday	Aug 24	Eve	1130-1930	None
Friday	Aug 25	Day	0530-1230	None
Saturday	Aug 26	Mid	2230-0630	None
Sunday	Aug 27	Mid	0000-0800	8 hours
Monday	Aug 28	Off	None	None
Tuesday	Aug 29	Eve	1454-2354	None

4.2.3 Operations Supervisor

The OS providing general supervision in Area 3 at the time of the accident had been employed by the FAA in December 2008, and after initial training at the FAA academy began working at ZTL ARTCC in April 2009. He had certified as OS in November 2015.

He was 45 years old, held a current second-class medical clearance and had received his last air traffic control physical on July 14, 2023. Neither post-accident drug nor alcohol testing were ordered or conducted, and he stated he had taken only his prescribed maintenance medications on the day of the accident. He stated that these medications were documented in his medical record, and he had taken no other medications. In the terms of excellent, good, fair, or poor; he described his health as excellent. His working hours for the week leading up to and including the day of the accident were:

Day	Date	Shift	Hours	Overtime
Wednesday	Aug 23	Eve	1435-2235	None
Thursday	Aug 24	Eve	1200-2000	None
Friday	Aug 25	Day	0600-1400	None
Saturday	Aug 26	Day	0430-1230	None
Sunday	Aug 27	Off	None	None
Monday	Aug 28	Off	None	None
Tuesday	Aug 29	Eve	1430-2230	None

4.2.4 Operations Manager

The OM providing general oversight in the ARTCC on the day of the accident had been employed by the FAA in April 2008, and after initial training at the FAA academy began working at ZTL ARTCC in June 2008. He had certified as OM in May 2015.

He was 39 years old and was not required to maintain a medical clearance. Neither post-accident drug nor alcohol testing were ordered or conducted, and he stated he had not taken any medications of any kind on the day of the accident. In the

terms of excellent, good, fair, or poor; he described his health as excellent. His working hours for the week leading up to and including the day of the accident were:

Day	Date	Shift	Hours	Overtime
Wednesday	Aug 23	Day	0800-1600	None
Thursday	Aug 24	Day	0800-1600	None
Friday	Aug 25	Day	0630-1430	None
Saturday	Aug 26	Off	None	None
Sunday	Aug 27	Off	None	None
Monday	Aug 28	Eve	1430-2230	None
Tuesday	Aug 29	Eve	1430-2230	None

4.3 Non-Involved ATC Personnel

4.3.1 Quality Control Manager

The QCM for ZTL ARTCC was 56 years old and had been employed by the FAA in 1990. After initial training at the FAA academy, he began working at ZTL ARTCC where he worked for 17 years before transferring to New York (ZNY) ARTCC for several years, then to FAA Headquarters for a few years, then back to ZNY ARTCC for a short time before ultimately returning to ZTL ARTCC where he served as OM until being selected as QCM in December 2022, serving as acting until January 2023 when the position became permanent.

4.3.2 Traffic Management Officer

The TMO for the Atlanta district was 45 years old and had been employed by the FAA in September 2000. After initial training at the FAA academy, he began working at Montgomery Airport Traffic Control Tower (MGM ATCT) until 2003 when he transferred to Memphis (MEM) ATCT. In 2007, he returned to MGM ATCT as an OS until 2008 when he accepted a position at A80 TRACON where he served as CPC, OS, and various support manager roles until moving to a job in airspace and procedures with the Atlanta district. In 2020 he was selected as the TMO for Atlanta district.

5.0 Air Traffic Control Procedures

5.1 FAA Order JO 7110.65AA, Air Traffic Control

Chapter 2, Section 1, General, paragraph 2-1-2, Duty Priority, stated in part:

c. Provide and/or solicit weather information in accordance with procedures and requirements outlined in this order.

Chapter 2, Section 6, Weather Information, paragraph 2-6-1, Familiarization, stated in part:

Controllers must become familiar with pertinent weather information when coming on duty and stay aware of current and forecasted weather information needed to perform ATC duties.

Chapter 2, Section 6, Weather Information, paragraph 2-6-2, PIREP Solicitation and Dissemination stated in part:

Emphasis must be placed on the solicitation and dissemination of Urgent (UUA) and Routine (UA) PIREPs. Timely dissemination of PIREPs alerts pilots to weather conditions and provides information useful to forecasters in the development of aviation forecasts. PIREPs also provide information required by ATC in the provision of safe and efficient use of airspace. This includes reports of strong frontal activity, squall lines, thunderstorms, light to severe icing, wind shear and turbulence (including clear air turbulence) of moderate or greater intensity, braking action, volcanic eruptions and volcanic ash clouds, detection of sulfur gases in the cabin, and other conditions pertinent to flight safety. Controllers must provide the information in sufficient detail to assist pilots in making decisions pertinent to flight safety.

NOTE - Routine PIREPs indicating a lack of forecasted weather conditions, for example, a lack of icing or turbulence, are also valuable to aviation weather forecasters and pilots. This is especially true when adverse conditions are expected or forecasted but do not develop or no longer exist.

a. Solicit PIREPs when requested, deemed necessary or any of the following conditions exists or is forecast for your area of jurisdiction:

1. Ceilings at or below 5,000 feet. These PIREPs must include cloud bases, tops and cloud coverage when available. Additionally, when providing approach control services, ensure that at least one descent/climb-out PIREP and other related phenomena is obtained each hour.

- a. Visibility (surface or aloft) at or less than 5 miles.*
- b. Thunderstorms and related phenomena.*
- c. Turbulence of moderate degree or greater.*
- d. Icing of light degree or greater.*
- e. Wind shear.*
- f. Braking action reports less than good.*
- g. Volcanic ash clouds.*

b. Record with the PIREPs:

1. Time.
2. Aircraft position.
3. Type aircraft.
4. Altitude.
5. When the PIREP involves icing include:
 - (a) Icing type and intensity.
 - (b) Air temperature in which icing is occurring.

c. Obtain PIREPs directly from the pilot, or if the PIREP has been requested by another facility, you may instruct the pilot to deliver it directly to that facility.

PHRASEOLOGY–

REQUEST/SAY FLIGHT CONDITIONS. Or if appropriate,
REQUEST/SAY (specific conditions; i.e., ride, cloud, visibility, etc.)
CONDITIONS.

d. Disseminate PIREPs as follows:

2. ENROUTE. Relay all operationally significant PIREPs to the facility weather coordinator.

5.2 ZTL ARTCC Order 7230.1Q, Facility Operations and Administration

Chapter 5, Section 1, Area Supervision Objectives, paragraph 5-1-8 stated in part:

OSIC is responsible for knowing the whereabouts of area controllers on duty to ensure their availability for position assignments. Assign personnel to positions as required by activity, equipment, and facility function. Consolidate positions in consideration of activity and qualification of the personnel involved. To the extent traffic volume and staffing levels on a given day permit, position assignments must be rotated among the qualified employees and relief periods must be given. Ensure breaks are equitable and of a reasonable duration.

Chapter 5, Section 1, Area Supervision Objectives, paragraph 5-1-9 stated in part:

The OSIC is responsible for directing the training of ATCS's on duty. Specific duties include but are not limited to:

- a. Assign and monitor On the Job Training (OJT).*
- b. Coordinate proficiency/currency training.*
- c. Ensure that OJT is productive and commensurate with the developmental's level of experience.*
- d. Ensure the On the Job Training Instructor (OJTI) is given time to prepare OJT training reports.*
- e. Allow the OJTI and the student sufficient time for meaningful performance feedback on the same day training is conducted.*
- f. Ensure training time is logged as required.*
- g. At a minimum of once per shift, OSICs will verify that all operational personnel on duty have completed and acknowledged receipt for all TEAM (or electronic equivalent) items identified as Due Today".*

Chapter 14, Section 3, Atlanta Arrival Coordinator (TMAC1), paragraph 14-3-3 stated in part:

Responsibilities of the TMAC1 include:

Cooperate and coordinate with A80 TMC, ZTL STMC, ZTL OSIC's, and other involved facilities to ensure an optimum arrival flow is provided into the Atlanta (ATL) terminal area, maximizing landing capacity.

Utilize TMI's to include Ground Delay Programs (GDP), Ground Stops (GS), Airborne holding, Airspace Flow Program (AFP), Miles-In-Trail (MIT), and Time-Based Flow Management (TBFM) to manage the ATL arrival flow. Consider current and forecast weather during all inter and intra-facility actions and initiatives.

Monitor the ATL airport acceptance rate (AAR) to ensure it is consistent with weather reports.

Coordinate alternative arrival routes for fix balancing. When it is necessary, reroute/fix balance aircraft departing BHM, CHA, TYS, AVL, GSP, CLT, and GSO.

Change the TBFM runway configuration as necessary after communications with A80 TMC, and notification of affected first tier facilities, affected ZTL TMU positions, and if necessary (ex. Full metering in the Areas affected ZTL Areas.

F. INCLUDED FIGURES

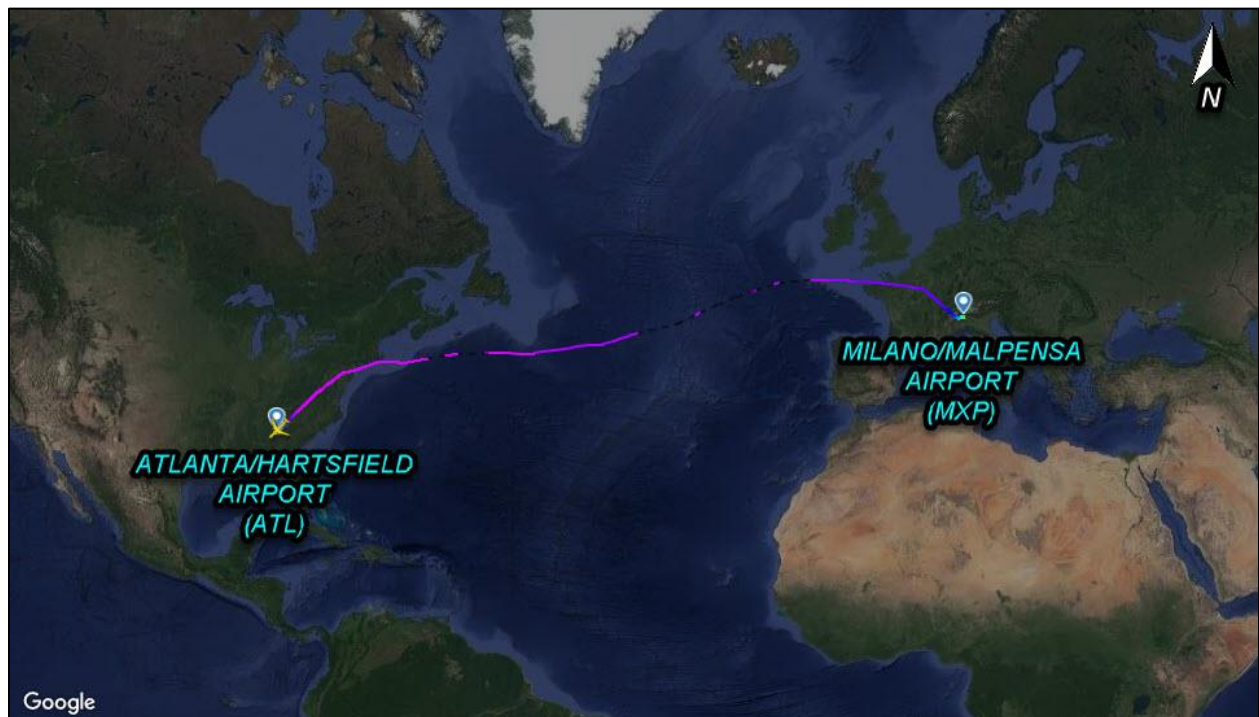


Figure 1. Overview of the entire accident flight track of DAL175 with point of origin and destination depicted and overlaid onto satellite imagery.

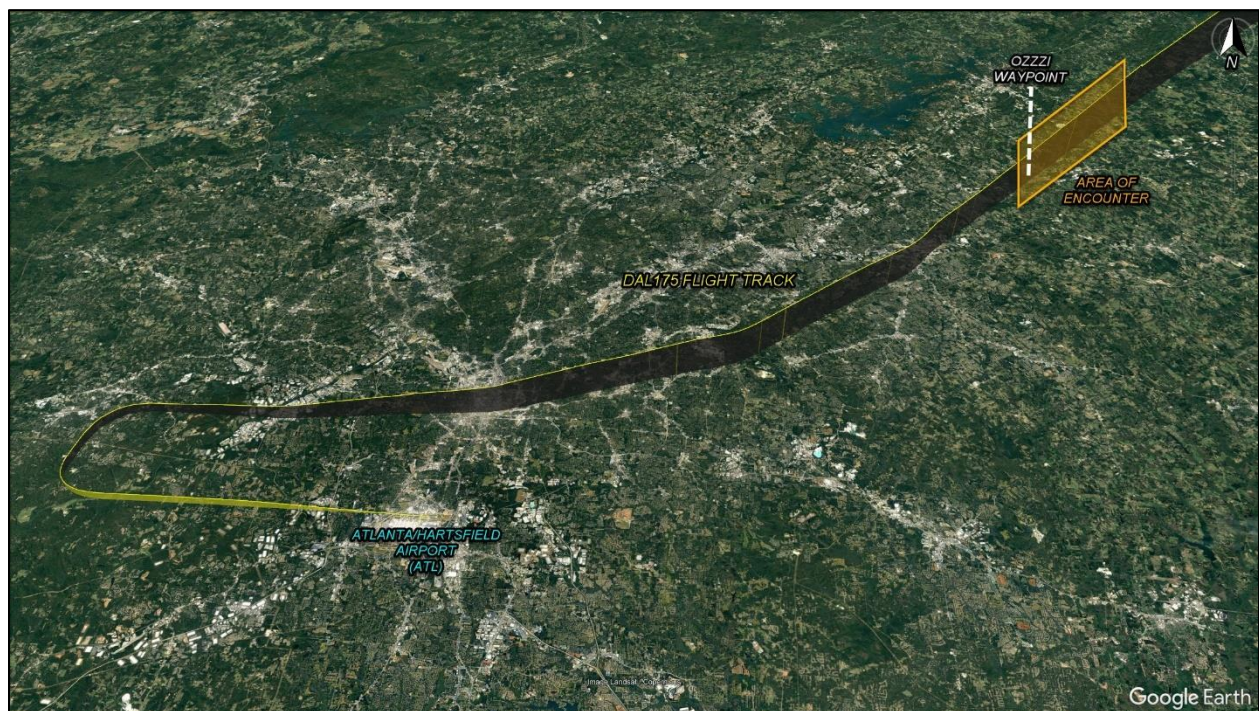


Figure 2. Profile view of the latter segment of the accident flight track of DAL175 with the area of turbulence encounter highlighted and overlaid onto satellite imagery.



Figure 3. Overhead view of latter segment of the accident flight track of DAL175 with area of turbulence encounter highlighted, destination airport depicted, and overlaid onto satellite imagery.

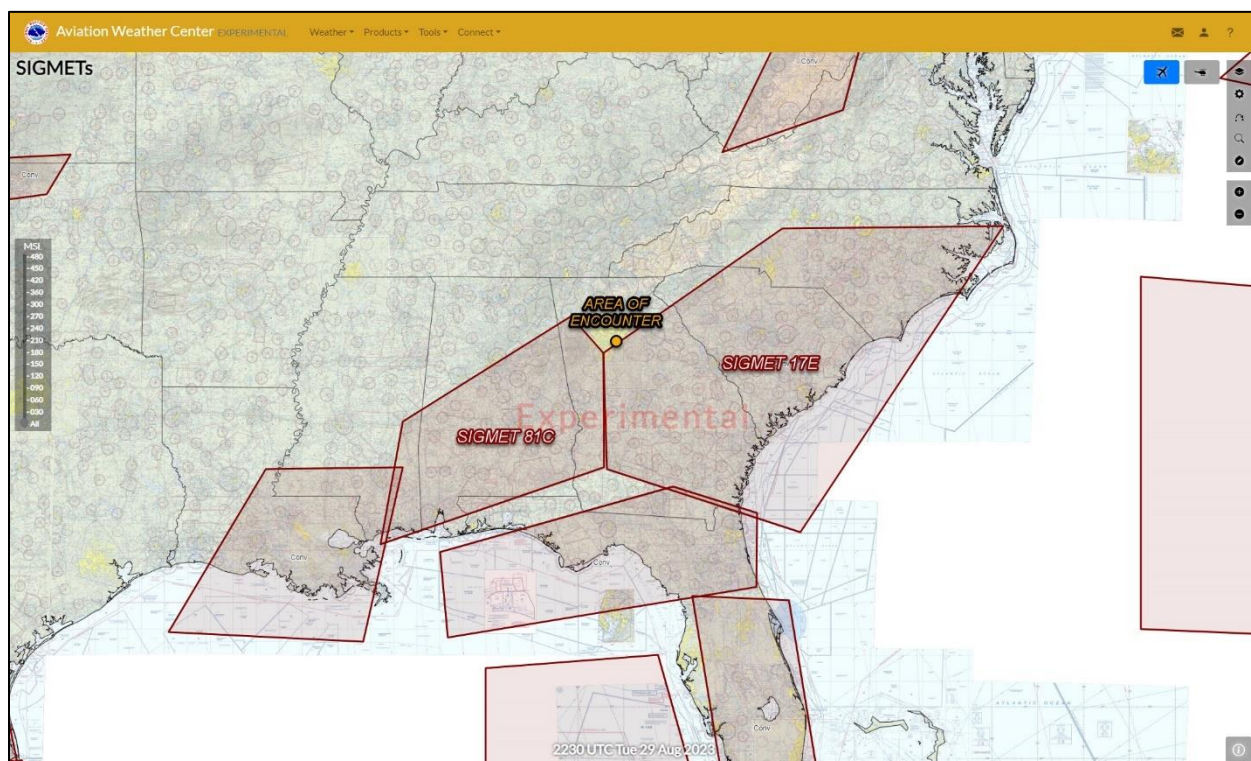


Figure 4. Graphical boundaries of the SIGMETs that were active at the time of the accident and overlaid on aeronautical charting.



Figure 5. Side-by-side view of the Logen sector area diagram (left) and corresponding photograph of the Logen sector controller's radar display (right).

G. LIST OF ATTACHMENTS

- Attachment 1: Photo Array - ZTL ARTCC Control Room
- Attachment 2: Photo Array - ZTL ARTCC ERAM Playback
- Attachment 3: Interview Transcripts
- Attachment 4: ATC Audio Partial Transcript
- Attachment 5: ADS-B Data
- Attachment 6: ZTL ARTCC - Facility Logs and Records
- Attachment 7: ZTL ARTCC - Facility Procedural Documentation
- Attachment 8: ZTL ARTCC - Controller Training Documentation

Submitted by:

Michael J. Brown
Air Traffic Control Investigator