



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

# Aviation Investigation Final Report

<b>Location:</b>	Atlantic Ocean, Atlantic Ocean	<b>Accident Number:</b>	DCA23LA252
<b>Date &amp; Time:</b>	April 22, 2023, 12:00 UTC	<b>Registration:</b>	N770AN
<b>Aircraft:</b>	Boeing 777-223	<b>Aircraft Damage:</b>	None
<b>Defining Event:</b>	Turbulence encounter	<b>Injuries:</b>	2 Serious, 2 Minor, 217 None
<b>Flight Conducted Under:</b>	Part 121: Air carrier - Scheduled		

## Analysis

American Airlines flight 748 experienced turbulence enroute to Comunidad De Madi (MAD), Madrid, Spain. As a result of the turbulence, three flight attendants sustained injuries, two being serious, while one passenger sustained a minor injury. The airplane was not damaged, and the flight crew continued to MAD where they were met by emergency medical technicians (EMTs) upon landing. The flight was a regularly scheduled passenger flight from Charlotte International Airport (CLT), Charlotte, North Carolina to MAD.

The flight crew reported having a view of lightning at about an 11 o'clock position. The onboard radar also indicated rain ahead of them. Upon confirming that the sky above them was clear of any cloud cover or weather, the flight crew requested an up to 20-mile deviation of course to avoid the weather ahead, to which air traffic control (ATC) approved. As they approached the area where the radar had previously shown that there was rain, the radar was no longer showing rain and the flight crew could see no signs of rain directly ahead of them.

The flight crew reported attempts to reference both of their personal weather apps to confirm the weather shown on the cockpit radar but was unsuccessful due to the lack of internet connection. Because of this, the flight crew concluded the weather to have passed and subsequently decided to no longer deviate from the original course. The unexpected turbulence event was experienced soon after.

The flight crew reported that the turbulence was sudden and came without warning. The cabin crew reported they were preparing for arrival service into MAD when they experienced a "sudden loss in altitude" and a series of jolts. The flight and cabin crew both reported that the turbulence lasted around 30 - 40 seconds and that flight crew reported that the autopilot disengaged but did not cause a deviation in altitude of more than 200 feet.

Three flight attendants reported they were preparing the back galley for meal service when the unexpected turbulence occurred, causing all three flight attendants to be thrown in the air and “slammed” on the floor. The flight attendants also reported that a passenger was thrown in the air and hit their head. After landing, the three flight attendants were seen by EMTs, and all were taken to the local hospital for further care. The flight crew was aware of thunderstorms in the area, subsequently the seatbelt sign was on, but no announcement was made to inform passengers or cabin crew of potential turbulence.

The flight crew informed ATC about the injuries and requested EMTs to meet the airplane upon arrival.

## Probable Cause and Findings

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

An encounter with inadvertent convective turbulence during cruise flight.

### Findings

Environmental issues	Convective turbulence - Accuracy of related info
Environmental issues	(general) - Effect on personnel
Personnel issues	Illness/injury - Cabin crew

## Factual Information

### History of Flight

Enroute	Turbulence encounter (Defining event)
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### Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor	Age:	59,
Airplane Rating(s):	Single-engine land; Single-engine sea	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	5-point
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	Airplane multi-engine	Toxicology Performed:	
Medical Certification:	Class 1	Last FAA Medical Exam:	February 20, 2023
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	January 26, 2023
Flight Time:	198 hours (Total, this make and model)		

### Co-pilot Information

Certificate:	Airline transport	Age:	64
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	5-point
Instrument Rating(s):		Second Pilot Present:	Yes
Instructor Rating(s):		Toxicology Performed:	
Medical Certification:	Class 1	Last FAA Medical Exam:	January 10, 2023
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	August 27, 2022
Flight Time:	2799 hours (Total, this make and model)		

## Pilot-rated passenger Information

Certificate:	Age:	
Airplane Rating(s):	Seat Occupied:	Rear
Other Aircraft Rating(s):	Restraint Used:	Unknown
Instrument Rating(s):	Second Pilot Present:	Yes
Instructor Rating(s):	Toxicology Performed:	
Medical Certification:	Last FAA Medical Exam:	
Occupational Pilot:	Last Flight Review or Equivalent:	
Flight Time:	15720 hours (Total, all aircraft)	

## Cabin crew Information

Certificate:	Age:	
Airplane Rating(s):	Seat Occupied:	None
Other Aircraft Rating(s):	Restraint Used:	None
Instrument Rating(s):	Second Pilot Present:	Yes
Instructor Rating(s):	Toxicology Performed:	
Medical Certification:	Last FAA Medical Exam:	
Occupational Pilot:	Last Flight Review or Equivalent:	
Flight Time:		

## Cabin crew Information

Certificate:	Age:	
Airplane Rating(s):	Seat Occupied:	None
Other Aircraft Rating(s):	Restraint Used:	None
Instrument Rating(s):	Second Pilot Present:	Yes
Instructor Rating(s):	Toxicology Performed:	
Medical Certification:	Last FAA Medical Exam:	
Occupational Pilot:	Last Flight Review or Equivalent:	
Flight Time:		

## Cabin crew Information

<b>Certificate:</b>	<b>Age:</b>
<b>Airplane Rating(s):</b>	<b>Seat Occupied:</b> None
<b>Other Aircraft Rating(s):</b>	<b>Restraint Used:</b> None
<b>Instrument Rating(s):</b>	<b>Second Pilot Present:</b> Yes
<b>Instructor Rating(s):</b>	<b>Toxicology Performed:</b>
<b>Medical Certification:</b>	<b>Last FAA Medical Exam:</b>
<b>Occupational Pilot:</b>	<b>Last Flight Review or Equivalent:</b>
<b>Flight Time:</b>	

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Boeing	<b>Registration:</b>	N770AN
<b>Model/Series:</b>	777-223	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	1999	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Transport	<b>Serial Number:</b>	29578
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	288
<b>Date/Type of Last Inspection:</b>	April 20, 2023 Continuous airworthiness	<b>Certified Max Gross Wt.:</b>	648000 lbs
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	2 Turbo fan
<b>Airframe Total Time:</b>	89844.55 Hrs at time of accident	<b>Engine Manufacturer:</b>	ROLLS-ROYCE
<b>ELT:</b>	C126 installed, not activated	<b>Engine Model/Series:</b>	RB-211 SERIES
<b>Registered Owner:</b>	AMERICAN AIRLINES INC	<b>Rated Power:</b>	22000 Lbs thrust
<b>Operator:</b>	AMERICAN AIRLINES INC	<b>Operating Certificate(s) Held:</b>	Flag carrier (121)
<b>Operator Does Business As:</b>	American Airlines	<b>Operator Designator Code:</b>	AALA

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Instrument (IMC)	<b>Condition of Light:</b>	Night
<b>Observation Facility, Elevation:</b>		<b>Distance from Accident Site:</b>	
<b>Observation Time:</b>		<b>Direction from Accident Site:</b>	
<b>Lowest Cloud Condition:</b>	Clear	<b>Visibility</b>	
<b>Lowest Ceiling:</b>		<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	76 knots /	<b>Turbulence Type Forecast/Actual:</b>	/ Convective
<b>Wind Direction:</b>	216°	<b>Turbulence Severity Forecast/Actual:</b>	/ Severe
<b>Altimeter Setting:</b>	29.92 inches Hg	<b>Temperature/Dew Point:</b>	
<b>Precipitation and Obscuration:</b>			
<b>Departure Point:</b>	Charlotte, NC (CLT)	<b>Type of Flight Plan Filed:</b>	Military VFR
<b>Destination:</b>	Madrid, OF (MAD)	<b>Type of Clearance:</b>	Unknown
<b>Departure Time:</b>	04:39 Local	<b>Type of Airspace:</b>	Class A

## Wreckage and Impact Information

<b>Crew Injuries:</b>	2 Serious, 1 Minor, 9 None	<b>Aircraft Damage:</b>	None
<b>Passenger Injuries:</b>	1 Minor, 208 None	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	2 Serious, 2 Minor, 217 None	<b>Latitude, Longitude:</b>	39.011172,-41.008763(est)

## Administrative Information

Investigator In Charge (IIC):	Brazy, Douglass
Additional Participating Persons:	AVP110; FAA; Washington, DC
Original Publish Date:	July 18, 2024
Last Revision Date:	
Investigation Class:	<a href="#">Class 4</a>
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	<a href="https://data.nts.gov/Docket?ProjectID=107126">https://data.nts.gov/Docket?ProjectID=107126</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).