



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

November 25, 2019

Weather Study

METEOROLOGY

DCA19LA134

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A. ACCIDENT

Location: New York, New York
Date: April 10, 2019
Time: 2040 eastern daylight time
0040 Universal Coordinated Time (UTC) on April 11, 2019
Airplane: American Airlines flight 300, Airbus A321; Registration: N114NN

B. METEOROLOGIST

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C. SUMMARY

On April 10, 2019, about 2040 EDT, American Airlines flight 300, an Airbus A321, N114NN, experienced a left roll and the left wingtip struck the ground and a runway distance marker during takeoff from runway 31L at John F. Kennedy International Airport (KJFK), Queens, New York. The flight crew declared an emergency and safely returned to the airfield approximately 30 minutes later. There were no injuries to the 110 passengers and crew onboard and the airplane was substantially damaged. The regularly scheduled passenger flight was operating under 14 *Code of Federal Regulations* (CFR) Part 121 from KJFK to Los Angeles International Airport (KLAX), Los Angeles, California.

D. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's Senior Meteorologist was not on scene for this investigation and conducted the meteorology phase of the investigation from the Washington D.C. office, collecting data from official National Weather Service (NWS) sources including the Weather Prediction Center (WPC) and the National Center for Environmental Information (NCEI). All times are eastern daylight time (EDT) based upon the 24-hour clock, local time is -4 hours from UTC, and UTC=Z. NWS airport and station identifiers use the standard International Civil Aviation Organization 4-letter station identifiers versus the International Air Transport Association 3-letter identifiers, which deletes the initial country code designator "K" for U.S. airports. 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.

The accident site was located at latitude 40.641389° N and longitude 73.778056° W, at an elevation of approximately 12 ft.

E. 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 can be found in the joint NWS and Federal Aviation Administration (FAA) Advisory Circular “Aviation Weather Services”, AC 00-45H change 1.

1.1 Surface Analysis Chart

The northeast section of the NWS Surface Analysis Chart for 2000 EDT is included as figure 1 with the approximate accident site marked by a red star. The chart depicted a ridge of high pressure extending from northern Canada southeastward across the Great Lakes into New York and New Jersey. A smaller, less-defined high pressure system at 1014-hectopascals (hPa)¹ was located to the south-southeast off the New Jersey and Delaware coast in the Atlantic Ocean. A strong temperature differential existed under the cold-core high pressure ridge with temperatures in the teens over Canada to the 50’s degrees Fahrenheit (F) in the New York city area in the vicinity of the accident site. No frontal boundaries were identified in the vicinity of the accident site.

The station model in the vicinity of the accident site depicted northerly winds of 10 to 15 knots, clear skies, with temperatures of 52° F, and dew point temperatures of 27° F.

¹ Hectopascals is the new NWS reference for reporting sea level pressure and is interchangeable with the former term millibar (mb) with the same units. Standard sea-level pressure is 1013.25-hPa at 59° Fahrenheit (F) or 15° Celsius (C).

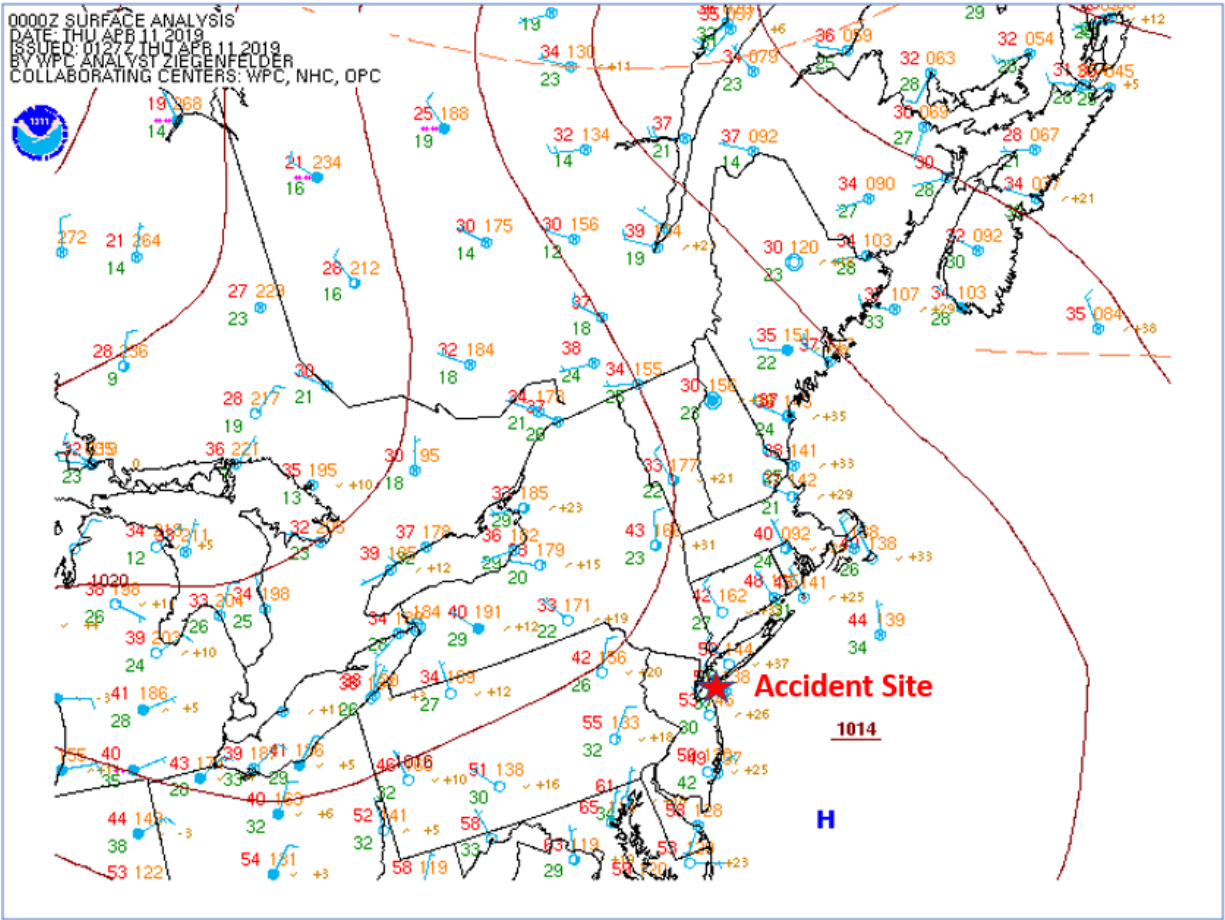


Figure 1 - Northeast section of the NWS Surface Analysis Chart for 2000 EDT

A review of the NWS National Composite Radar imagery surrounding the period indicated no significant meteorological echoes associated with any precipitation over the area on April 10, 2019, surrounding the time of the accident.

2.0 Observations

The official observations issued surrounding the accident site were documented using standard meteorological aerodrome reports (METARs) and specials (SPECI). Cloud heights are reported above ground level (agl) in the following section, and the magnetic variation was estimated at 13° W based on the latest sectional chart for the area.

2.1 John F. Kennedy International Airport, Queens, New York

John F. Kennedy International Airport (JFK), Queens, New York, had a federally installed and maintained Automated Surface Observation System (ASOS)² and was augmented by tower

² The JFK ASOS was located near the approach end of runway 22L located approximately 1.5 nautical miles

personnel as needed. The following conditions were reported at the approximate time of the accident.

Weather observation for KJFK at 2051 EDT, wind from 360° at 17 knots, visibility 10 miles or more, scattered clouds at 25,000 ft agl, temperature 10° C, dew point temperature -3° C, altimeter 29.98 inches of mercury (Hg). Remarks: automated station with a precipitation discriminator, sea level pressure 1015.3-hPa, temperature 10.0° C, dew point temperature -2.8° C.

The raw observations from approximately 1850 through 2150 EDT were as follows, the observation documented above is in bold italic print with the time of the accident added for reference:

METAR KJFK 102251Z 34018G26KT 10SM FEW070 FEW250 13/M02 A2992 RMK AO2 PK WND 36026/2244 SLP133 T01281017=

METAR KJFK 102351Z 33015KT 10SM FEW070 FEW250 11/M03 A2996 RMK AO2 PK WND 34026/2257 SLP145 T01111028 10161 20111 53034=

Accident 0040Z

METAR KJFK 110051Z 36017KT 10SM SCT250 10/M03 A2998 RMK AO2 SLP153 T01001028=

METAR KJFK 110151Z 35015KT 10SM SCT250 09/M02 A3002 RMK AO2 SLP166 T00891022=

2.1.1 KJFK 5-minute ASOS Observations

The KJFK 5-minute ASOS observation at the time of the accident was as follows:

KJFK weather at 2040 EDT, wind from 350° at 16 knots, visibility 10 miles or more, sky clear below 12,000 ft, temperature 10° C, dew point temperature -3° C, altimeter 29.98 inches of Hg, pressure altitude -30 ft, relative humidity 40%, density altitude -600 ft³, magnetic wind from 010 at 16 knots. Remarks; automated station with a precipitation sensor, temperature 10.0° C, dew point -2.8° C.

The raw 5-minute observations⁴ from 2000 through 2055 EDT were as follows:

20:00:31 5-MIN KJFK 110000Z 34015KT 10SM CLR 11/M02 A2997 -20 39 -400 350/15 RMK AO2 T01111022

20:05:31 5-MIN KJFK 110005Z 33015G23KT 10SM CLR 11/M02 A2997 -20 40 -500 350/15G23 RMK AO2 T01061022

20:10:31 5-MIN KJFK 110010Z 33016G22KT 10SM CLR 11/M02 A2997 -20 40 -500 350/16G22 RMK AO2 T01061022

northeast from the accident site.

³ Both the pressure altitude and density altitude were below sea level conditions.

⁴ Time has been converted from local standard time (EST) to daylight savings time (EDT) from the original code.

20:15:31 5-MIN KJFK 110015Z 34017KT 10SM CLR 11/M02 A2997 -20 40 -500 350/17 RMK AO2 T01061022
20:20:31 5-MIN KJFK 110020Z 34016KT 10SM CLR 11/M02 A2997 -30 40 -500 350/16 RMK AO2 T01061022
20:25:31 5-MIN KJFK 110025Z 34015KT 10SM CLR 11/M02 A2997 -30 40 -500 350/15 RMK AO2 T01061022
20:30:31 5-MIN KJFK 110030Z 34013KT 10SM CLR 11/M02 A2998 -30 40 -500 350/13 RMK AO2 T01061022
20:35:31 5-MIN KJFK 110035Z 35017G21KT 10SM CLR 10/M03 A2997 -30 40 -600 010/17G21 RMK AO2
T01001028

Accident 2040 EDT

20:40:31 5-MIN KJFK 110040Z 35016KT 10SM CLR 10/M03 A2998 -30 40 -600 010/16 RMK AO2 T01001028
20:45:31 5-MIN KJFK 110045Z 36014KT 10SM CLR 10/M03 A2998 -30 40 -600 010/14 RMK AO2 SLP151
T01001028
20:50:31 5-MIN KJFK 110050Z 36015KT 10SM SCT250 10/M03 A2998 -40 40 -600 010/15 RMK AO2 SLP152
T01001028
20:55:31 5-MIN KJFK 110055Z 36015KT 10SM CLR 10/M03 A2998 -40 40 -600 010/15 RMK AO2 T01001028

2.1.2 KJFK 1-minute ASOS Data

The KJFK ASOS 1-minute data was also reviewed surrounding the period. The wind data listed below represents the ASOS wind sensor's 2-minute average wind and the peak 5-second wind during the period, updated every minute.

Time	1-min wind	Peak Gust
0030Z	339° 13 KT	343° 13 KT
0031Z	344° 13 KT	341° 18 KT
0032Z	348° 15 KT	005° 19 KT
0033Z	349° 14 KT	330° 15 KT
0034Z	351° 14 KT	358° 19 KT
0035Z	354° 17 KT	349° 21 KT
0036Z	352° 17 KT	353° 20 KT
0037Z	350° 15 KT	344° 17 KT
0038Z	351° 14 KT	352° 18 KT
0039Z	354° 14 KT	002° 18 KT
0040Z	354° 16 KT	356° 20 KT
0041Z	353° 17 KT	356° 19 KT
0042Z	354° 16 KT	003° 20 KT
0043Z	359° 15 KT	358° 19 KT
0044Z	357° 14 KT	353° 16 KT
0045Z	355° 14 KT	348° 18 KT
0046Z	352° 15 KT	338° 17 KT
0047Z	354° 16 KT	001° 18 KT
0048Z	351° 15 KT	340° 18 KT
0049Z	348° 15 KT	338° 17 KT
0050Z	356° 15 KT	359° 18 KT

The KJFK ASOS 2-minute average wind at 2040 EDT (0040Z) was from 354° true at 16 knots with the peak gust from 356° at 20 KT, which indicated a cross wind component of 14 knots to 17 knots based on peak gusts for runway 31L.

3.0 Integrated Terminal Weather System

The FAA Integrated Terminal Weather System (ITWS) which provides controllers an integrated display of the various weather radars over the area, from the WSR-88D “NEXRAD”, ASR-9, and any terminal doppler weather radar (TDWR), in addition to any wind shear detection systems, latest METARs and forecast in a single display system was requested for the period. A review of the ITWS displays during the period depicted no significant meteorological echoes associated with any precipitation over the area. The airport weather sensor (AWT) displayed a wind from the north at 16 knots for the period from 2030 through 2040 EDT. No wind shear alerts were being issued for any runway at KJFK during the period.

4.0 Sounding

To determine the vertical structure and state of the atmosphere over the accident site a High-Resolution Rapid Refresh (HRRR)⁵ numerical model data was retrieved from the NOAA Air

⁵ The HRRR is a National Oceanic and Atmospheric Administration (NOAA) real-time three-kilometer resolution,

Resources Laboratory and plotted on a standard Skew T log P diagram⁶ using the complete Rawinsonde Observation RAOB program software⁷. Figure 2 is the KJFK sounding plot for 2100 EDT on April 10, 2019 from the surface to approximately 21,000 ft. The sounding depicted a near surface temperature of 8.2° C (47° F), with a dew point temperature of 2.0° C (36° F), with a relative humidity of 65%. A surface-based temperature inversion due to radiational cooling to approximately 240 ft was also indicated with a lifted condensation level (LCL) at about 2,560 ft agl. The sounding was characterized as stable with a lifted index of 17.0; however, a shallow layer immediately above the temperature inversion through 3,000 ft was conditionally unstable.

The sounding wind profile indicated a surface wind from 353° at 6 knots with winds gusting to 15 knots with the wind backing to the northwest and west with height above the temperature inversion, and wind speeds greater than 20 knots above 500 ft. A low level wind maximum was at 900 ft with winds from 347° at 22 knots. The mean 0 to 6 kilometer or 18,000 ft wind was from 300° at 47 knots, with the level of maximum wind at 33,235 ft from 300° at 111 knots.

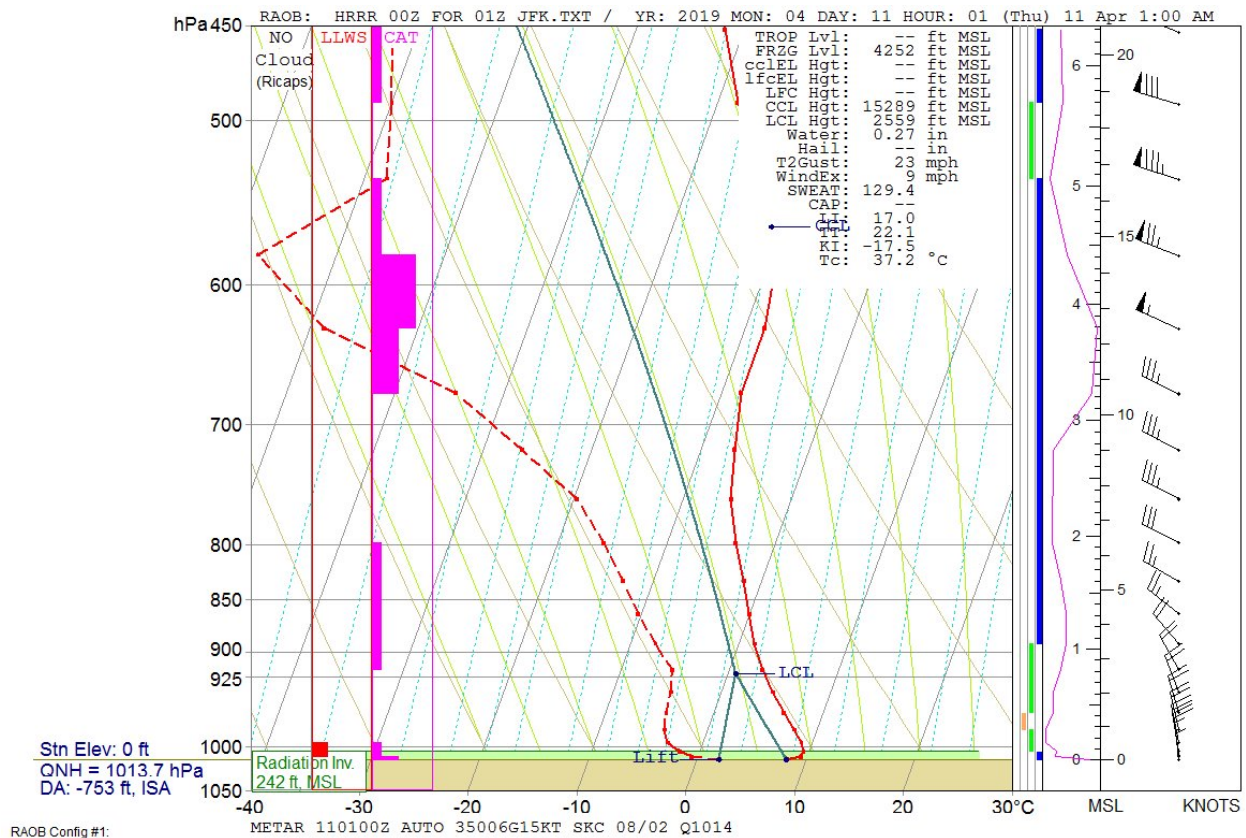


Figure 2 - HRRR numerical model sounding over KJFK for 2100 EDT on April 10, 2019

hourly-updated, cloud-resolving, convection-allowing atmospheric model, initialized by three-kilometer grids with three-kilometer radar assimilation. Radar data is assimilated in the HRRR every 15 minutes over a one-hour period.

⁶ Skew T log P diagram – is a standard meteorological plot or thermodynamic diagram using temperature and the logarithmic of pressure as coordinates, used to display winds, temperature, dew point, and various indices used to define the vertical structure of the atmosphere.

⁷ RAOB software – The complete RAwinsonde OBservation program is an interactive sounding analysis program developed by Environmental Research Services, Matamoras, Pennsylvania, for plotting and analyzing upper air data

The HRRR numerical model parameters of height, pressure, temperature (T), dew point temperature (Td), relative humidity (RH), wind direction and speed, and RAOB derived clear air turbulence (CAT), low-level wind shear (LLWS) potential from the surface through 9,000 ft is included in table format in figure 3.

Height (ft-MSL)	Pres (hPa)	T (C)	Td (C)	RH (%)	DD / FF (deg / kts)	CAT (FAA)	LLWS
0	1014	8.2	2.0	65	353 / 6	MDT	
80	1011	9.4	-0.6	50	352 / 15	LGT	LIGHT
242	1005	9.5	-1.9	45	351 / 18	LGT	LIGHT
514	995	9.0	-3.3	42	349 / 21		
898	981	7.9	-4.0	43	347 / 22		
1398	963	6.4	-4.4	46	345 / 21		
2018	941	4.7	-4.7	50	340 / 19		
2678	918	3.0	-5.3	54	332 / 19	LGT	
3439	892	1.4	-7.7	51	321 / 20	LGT	
4310	863	-0.1	-10.3	46	311 / 23	LGT	
5268	832	-1.7	-12.8	42	302 / 26	LGT	
6353	798	-3.7	-15.8	38	299 / 30		
7613	760	-5.6	-19.8	32	300 / 33		
9000	720	-6.9	-26.4	19	300 / 33		

Figure 3 - HRRR model parameters of height, pressure, temperature, dew point temperature, relative humidity, wind, turbulence, and low-level wind shear.

The data supported the potential for light to moderate turbulence below 500 ft, and between 2,600 ft and 5,000 ft. The more significant layer was noted between 10,600 ft and 14,000 ft where a layer of moderate to severe turbulence was indicated with a greater than 80% probability of occurrence due to strong vertical wind shear in that layer.

5.0 Aircraft In-Situ Reports

A search of the NOAA Forecast System Laboratory (FSL) archive site for Aircraft Meteorological Data Relay (AMDAR) reports provided data from several aircraft departing from KJFK around the time of the accident. These aircraft in-situ reports provided pressure altitude, pressure, temperature and wind information. Figure 4 presents data from an aircraft identified as #12095, which departed KJFK at 2032 EDT. Figure 5 presents data from an aircraft identified as #10696, which departed at 2052 EDT.

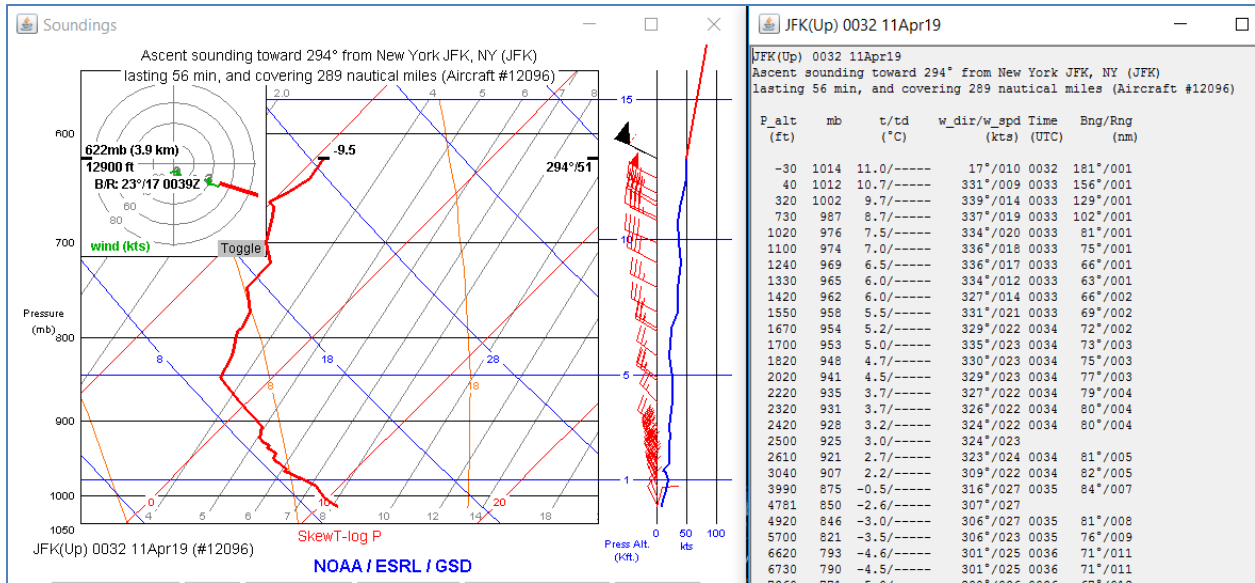


Figure 4 - Aircraft #12096 ascent sounding from KJFK at 2032 EDT. Plot on left and text data on right.

The sounding for aircraft #12096 indicated a surface wind from 017° at 10 knots, with the wind shifting to the northwest immediately above the surface with increasing wind speeds over 20 knots above 1,500 ft. The sounding also noted a low-level wind maximum near 1,020 ft with wind speeds of 20 knots.

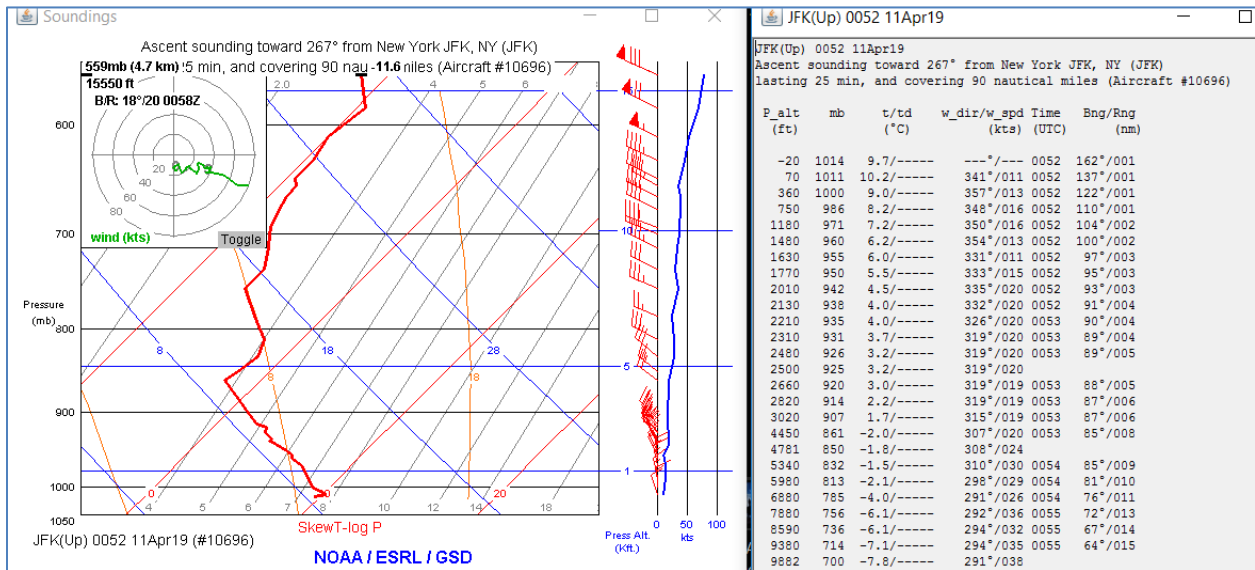


Figure 5 - Aircraft #10696 ascent sounding from KJFK at 2052 EDT. Plot on left and text data on right.

Aircraft #10696's ascent sounding at 2052 EDT depicted a similar sounding with winds from the north backing to the northwest and west with height, with wind speeds of 20 knots or greater above 2,000 ft. A shallow surface based inversion was noted on the sounding at a pressure altitude of 70 ft.

6.0 Pilot Reports

The following pilot reports (PIREPs) were recorded below 21,000 ft and within 100 miles of the accident site within 4 hours prior to and after the accident. The reports are provided in standard format and code with time in UTC and followed by the decoded report in plain language and in local time. During the period there were multiple reports of light to moderate turbulence above 21,000 ft over the north eastern United States that were not captured for this report.

TEB UUA /OV TEB190002/TM 2112/FLDURGD/TP BE9L/RM LLWS +/- 5 KT

Teterboro Airport (TEB), Teterboro, NJ, urgent pilot report (UUA); Over- 190° azimuth and 2 miles from TEB VORTAC, Time – 1712 EDT (2112Z); Altitude – during descent; Type Aircraft – Beechcraft King Air; Remarks – Low-Level Wind Shear (LLWS) plus and minus 5 knot of airspeed.

*JFK UA /OV JFK/TM 2130/FLUNKN/TP B739/TB OCNL LGT CHOP UNKN/RM DURGC JFK VIA RBV.
ASDA653. AWC-WEB/*

JFK routine pilot report (UA); Over – JFK; Time – 1730 EDT (2130Z); Altitude – unknown; Type Aircraft – Boeing B737; Turbulence – occasional light chop; Remarks – encountered during climb out from JFK via the Robbinsville (RBV) departure route.

ISP UA /OV CCC080010/TM 2140/FL060/TP SR22/TB MOD

Long Island Mac Arthur Airport (ISP), Islip, NY routine pilot report (UA); Over – Calverton VORTAC (CCC); Time – 1740 EDT (2140Z); Altitude – 6,000 ft; Type Aircraft – Cirrus SR22; Turbulence – moderate.

HPN UA /OV HPN /TM 2256 /FL030 /TP C172 /WX FV99SM /WV 3002KT /TB NEG /RM SMOOTH

Westchester County Airport (HPN), White Plains, NY routine pilot report; Over – HPN; Time – 1856 EDT (2256Z); Altitude – 3,000 ft; Type Aircraft – Cessna 172; Weather – flight visibility unrestricted 99 miles; Wind – from 300° at 22 knots; Turbulence – negative; Remarks – smooth conditions.

ACY UA /OV RBV099014 /TM 0152 /FL190 /TP E75L /TB LGT CHOP 190 /RM DURGC LGA-RIC AWC-WEB

Atlantic City International Airport (ACY), Atlantic City, NJ, routine pilot report (UA); Over – Robbinsville VORTAC (RBV) on the 099° azimuth and 14 miles; Time – 2152 EDT (0152Z); Flight Level⁸ – FL190; Type Aircraft – Embraer EMB175; Turbulence – light chop at FL190; Remarks – during climb out from LaGuardia Airport (LGA) NY, to Richmond International Airport (RIC, Richmond, VA entered through the NWS Aviation Weather Center website.

7.0 NWS Forecasts

7.1 Terminal Aerodrome Forecasts

The NWS New York (KOKX) Weather Forecast Office (WFO) located in Upton, New York, was responsible for the issuance of the Terminal Aerodrome Forecast (TAF) for KJFK. A TAF is a concise statement of the expected meteorological conditions at an airport during a specified period usually 24 hours. TAFs are valid for a 5 mile radius around an airport's center point. The forecasts issued surrounding the period relevant to the preflight planning and the time of the accident was issued at 1924 EDT and was as follows.

⁸ Flight Level (FL) is reference to the aircraft flying a constant pressure altitude above 18,000 ft, with the altimeter set to 29.92 inches of Hg.

TAF KJFK 102324Z 1100/1206 33016KT P6SM FEW070 FEW300

FM110200 01010KT P6SM FEW300

FM111500 03008KT P6SM SCT070 SCT300

FM111700 17010KT P6SM SCT070 SCT300

FM120100 18007KT P6SM SCT050 BKN300=

The forecast for the time of departure expected wind from 330° at 16 knots, a few clouds at 7,000 ft agl, and a few clouds at 30,000 ft. The forecast did not expect any significant low-level wind shear and the crosswind component based on the wind was 8 knots for runway 31L.

7.2 Area Forecast Discussion

The NWS Area Forecast Discussions (AFD) are issued by each Weather Forecast Office (WFO) to describe the short term weather conditions within their region with an aviation section that includes the general conditions as it relates to the creation of the TAF. These are useful for additional aviation-related issues that cannot be encoded into the TAF. The discussion also gives some reasoning behind the forecast. These are generated roughly every 6 hours and correspond to the release of the latest TAFs for that office. The long term forecast and marine weather section have been excluded. The forecast discussion issued at 1950 EDT was as follows.

FXUS61 KOKX 102350

AFDOKX

Area Forecast Discussion

National Weather Service New York NY

750 PM EDT Wed Apr 10 2019

.SYNOPSIS..

High pressure will build in through Thursday before moving offshore Thursday night into Friday. A cold front will approach late Friday, move slowly across Friday night into Saturday morning, then stall not too far to the south this weekend. The front will return north as a warm front from late Sunday into Monday morning. Low pressure and a trailing cold front will then move across Monday afternoon, followed by generally fair weather Monday night into Tuesday night. A warm front will begin to slowly approach from the southwest on Wednesday.

.NEAR TERM /UNTIL 6 AM THURSDAY MORNING/...

Forecast on track this evening. Lingering gusts 20 to 25 mph will diminish after sunset. There will still be a weak pressure gradient through much of the night as the core of the building high pressure will be to our NW. The only locations that could see winds completely decouple will be across Orange County and possibly the Long Island Pine Barrens.

Any lingering stratocu diminishes this evening with mostly clear skies Decreasing winds and weak cold advection will allow temperatures to drop into the upper 20s to around 30 with some patchy frost possible across the NW interior. Long Island Pine Barrens may also drop below freezing, but expecting winds to stay slightly higher there, so not thinking there will be much frost development especially with dew points lowering. Temperatures will fall to around 40 for the NYC Metro area.

.SHORT TERM /6 AM THURSDAY MORNING THROUGH THURSDAY NIGHT/...

High pressure remains over the forecast area on Thursday. This will lead to a mostly sunny day with seasonable temperatures. Highs will be several degrees cooler than Wednesday, especially along the coast where winds will be coming off the cooler ocean water. A blend of MET/MAV MOS was used.

Clouds increase late in the day as a strong low pressure system develops over the Central Plains. Temperatures will stay in the 40s overnight into Friday morning.

.AVIATION /00Z THURSDAY THROUGH MONDAY/...

High pressure builds into the region through Thursday morning, then slides offshore during the afternoon.

VFR conditions through the TAF period.

Northwest to north winds become northerly early this evening, 4 to 7 kt. KSWF likely become light and variable after 06Z. Thursday seabreezes develop 17 to 18Z and move inland. KSWF likely remains variable around 6 kt through the day.

NY Metro Enhanced Aviation Weather Support...

Detailed information, including hourly TAF wind component forecasts, can be found at: <http://www.weather.gov/zny/n90>

KJFK TAF Comments: No unscheduled amendments expected tonight. The sea breeze may develop an hour or so later, with speeds increasing to 10-15kt late in the afternoon.

KLGA TAF Comments: No unscheduled amendments expected tonight. NE winds less than 10 kt likely until the sea breeze moves through which may be as late as 22Z.

KEWR TAF Comments: No unscheduled amendments expected tonight. The sea breeze may be an hour or so later than forecast.

KTEB TAF Comments: No unscheduled amendments expected tonight. The sea breeze may be an hour or so later than forecast.

KHPN TAF Comments: No unscheduled amendments expected tonight. Winds may become light and variable by midday before the sea breeze moves through around 20Z, possible as late as 22Z.

KISP TAF Comments: No unscheduled amendments expected tonight. The sea breeze may move through an hour or so later than forecast.

.OUTLOOK FOR 00Z FRIDAY THROUGH MONDAY...

.Thursday night...VFR.

.Friday-Saturday...MVFR or lower in showers late Friday into Saturday morning. S-SW winds G20-25kt. LLWS possible Friday morning across the western terminals.

.Sunday-Monday...MVFR or lower in showers. Isolated thunder Monday.

.HYDROLOGY...

Dry conditions are forecast through Thursday night. Rainfall from late Fri into Sat morning should range from 1/4 to 1/2 inch, highest inland.

More significant rainfall of 3/4 to 1 1/2 inches, and locally up to 2 inches, is possible with a stronger frontal system from Sunday night into Mon afternoon. The heaviest rainfall is expected late Sunday night/Mon morning.

.EQUIPMENT...

NYC NOAA Weather Radio Station KWO35 (162.55 MHz) remains off the air.

.OKX WATCHES/WARNINGS/ADVISORIES...

CT...None.

NY...None.
NJ...None.
MARINE...None.

SYNOPSIS...CB/Goodman
NEAR TERM...DS
SHORT TERM...CB
LONG TERM...Goodman
AVIATION...19
MARINE...CB/Goodman
HYDROLOGY...CB/Goodman
EQUIPMENT...

7.3 Winds and Temperature Aloft Forecast

The NWS NCEP winds and temperature aloft forecast⁹ valid at the time was valid for 0100 EDT on April 11, 2019 and valid for use between 2200 EDT through 0500 EDT. The winds and temperature data for JFK was as follows:

WINDS ALOFT FORECASTS
DATA BASED ON 110000Z
VALID 110600Z FOR USE 0200-0900Z. TEMPS NEG ABV 24000

<i>FT</i>	<i>3000</i>	<i>6000</i>	<i>9000</i>	<i>12000</i>	<i>18000</i>	<i>24000</i>	<i>30000</i>	<i>34000</i>	<i>39000</i>	<i>45000</i>	<i>53000</i>
<i>JFK</i>	<i>0215</i>	<i>2829-03</i>	<i>2840-06</i>	<i>2958-05</i>	<i>2868-16</i>	<i>2976-28</i>	<i>308445</i>	<i>309354</i>	<i>296560</i>	<i>296154</i>	<i>274358</i>

The forecast wind over JFK at 3,000 ft was from 020° at 15 knots, at 6,000 ft from 280° at 29 knots with a temperature of -3° C, and at 9,000 ft from 280° at 40 knots with a temperature of -6° C. The strongest wind was at 34,000 ft from 300° at 93 knots, with a temperature of -54° C.

8.0 NWS Inflight Weather Advisories

Inflight Aviation Weather Advisories are forecasts to advise en route aircraft of development of potentially hazardous weather. Inflight aviation weather advisories in the conterminous U.S. are issued by the NWS AWC, as well as from the Center Weather Service Units (CWSU) associated with FAA Air Route Traffic Control Centers (ARTCCs). There are four basic types of inflight aviation weather advisories: the Significant Meteorological Information (SIGMET), the Convective SIGMET, the Airmen's Meteorological Information (AIRMET), and the Center Weather Advisory (CWA). Inflight advisories serve to notify en route pilots of the possibility of encountering hazardous flying conditions which may not have been forecast at the time of the preflight briefing. Whether or not the condition described is potentially hazardous to a particular flight is for the pilot and or aircraft dispatcher to evaluate on the basis of experience and the operational limits of the aircraft. The following advisories were current during the period.

The NWS AWC issued SIGMET Romeo number 3 at 1755 EDT for moderate to occasional severe turbulence between FL180 and FL350, due to wind shear associated with the jet stream and

⁹ Official bulletin from NCEP is FBUS31 KWNO

reported by several air carrier aircraft. The text of the advisory is below and is depicted graphically in figure 6. In addition, the NWS AWC issued AIRMET Tango for moderate turbulence below 10,000 ft which is also included below and by Graphic-AIRMET Tango in figure 7. There were no Convective SIGMETs, AIRMET for IFR, icing, or low-level wind shear over the area during the period. The New York CWSU issued no CWAs or Meteorological Impact Statements (MIS) during the period.

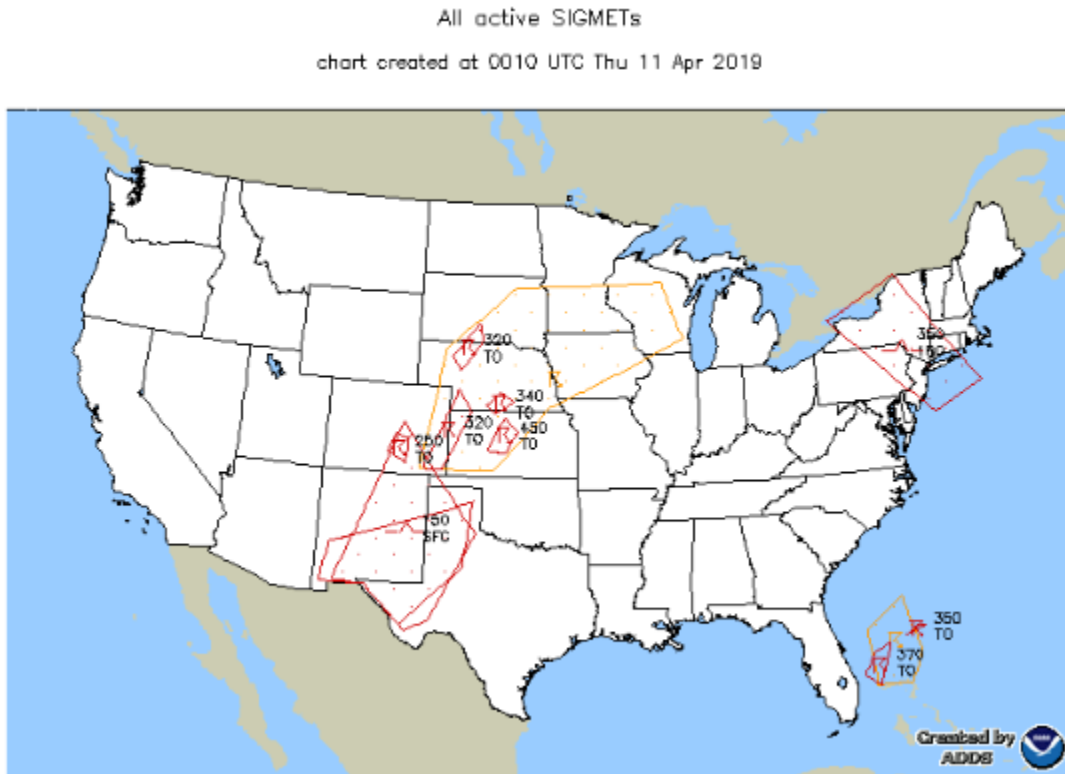


Figure 6 - SIGMET Romeo for occasional severe turbulence from FL180 to FL350

WSUS01 KKCI 102155
WSIR
BOSR WS 102155
SIGMET ROMEO 3 VALID UNTIL 110155
VT MA CT NY LO NJ PA AND CSTL WTRS
FROM 20WNW MSS TO 90SE HTO TO 50ESE SIE TO 20SSE YYZ TO 20WNW MSS
OCNL SEV TURB BTN FL180 AND FL350. DUE TO WNDSHR ASSOCD WITH
JTST. RPTD BY ACFT. CONDS CONTG BYD 0155Z.

TANGO 2019-04-11 00:00:00



Figure 7 - G-AIRMET Tango for turbulence valid for the period

WAUS41 KKCI 102045

WAIT

-BOST WA 102045

AIRMET TANGO UPDT 4 FOR TURB VALID UNTIL 110300

...SEE SIGMET ROMEO SERIES...

AIRMET TURB...ME NH VT MA RI CT NY NJ PA OH WV MD DC DE VA AND CSTL WTRS FROM 50S MPV TO 140SSE BGR TO 60ENE ACK TO 20ESE ACK TO 40SE CYN TO 20E ORF TO 40W RIC TO HMV TO 20NNE HNN TO JST TO 50S MPV MOD TURB BLW 100. CONDS ENDG 00-03Z.

AIRMET TURB...ME NH VT MA RI CT NY LO NJ PA OH LE WV MD DC DE VA NC SC AND CSTL WTRS FROM 20ESE YSC TO 50SW YSJ TO 200SE ACK TO 160SE SIE TO 50SSE GSO TO 30NNE SAV TO CAE TO PSK TO 30SSE DXO TO 20NNW JHW TO 20ESE YYZ TO 40WNW SYR TO 20ENE MSS TO 20ESE YSC MOD TURB BTN FL180 AND FL420. CONDS CONTG BYD 03Z THRU 09Z.

OTLK VALID 0300-0900Z...TURB ME NH VT MA RI CT NY LO NJ PA LE MD DC DE VA NC AND CSTL WTRS BOUNDED BY 60ESE YQB-60WSW YSJ-200SE ACK-160SE SIE-50ESE ORF-60SE ILM-20NW ILM-20NE EMI-30NW ERI-30WSW BUF-20E YYZ-40N SYR-30SE YOW-20ESE YSC-60ESE YQB MOD TURB BTN FL180 AND FL420. CONDS CONTG THRU 09Z.

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9.0 Astronomical Conditions

The astronomical conditions for April 10, 2019, over KJFK was obtained from software¹⁰ from the United States Naval Observatory and provided the following information.

<u>Sun</u>	
Begin civil twilight	0557 EDT
Sunrise	0625 EDT
Sunset	1929 EDT
End civil twilight	1957 EDT
Accident	2040 EDT

<u>Moon</u>	
Moonrise	0953 EDT
Moon transit	1725 EDT
Accident	2040 EDT
Moonset	2358 EDT

At the time of the accident at 2040 EDT the Sun was at an azimuth of 293° and was more than 13° below the horizon. The Moon phase was a waxing crescent with 31% of the Moon's visible disk illuminated and was at an altitude of 44° above the horizon at an azimuth of 259°.

Submitted by:

Don Eick
Senior Meteorologist

¹⁰ USNO Multiyear Interactive Computer Almanac (MICA) software program for calculating astronomical conditions.

