

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



DCA23LA462

METEOROLOGY

Specialist's Factual Report

February 6, 2024

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A. ACCIDENT

Location: Caribbean Sea

Date: 25 September 2023

Time: 0336 eastern daylight time (0736 UTC¹)

Aircraft: Type - Airbus A320-232; Registration - N569JB

B. METEOROLOGY SPECIALIST

Mike Richards

Senior Meteorologist

Office of Aviation Safety

Operational Factors Division (AS-30)

National Transportation Safety Board

C. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's meteorological specialist did not travel in support of this accident investigation and gathered all weather data remotely. Unless otherwise noted, all times are in eastern daylight time for 25 September 2023 (based upon the 24-hour clock), directions are referenced to true north, distances are in nautical miles and heights are above mean sea level (msl). The accident site was located at about: 14.95548248° north latitude; 78.54640961° west longitude at an altitude of about 34,500 feet.

This report provides information on turbulence in the accident region.

D. DETAILS OF THE INVESTIGATION

1.0 GDAS Model Sounding

A Global Data Assimilation System (GDAS) model² sounding (Figure 1) for near the accident site³ at 0500 was retrieved from the National Oceanic and Atmospheric Administration's (NOAA) Air Resources Laboratory and analyzed by the RAwinsonde OBservation (RAOB) program. The wind near 35,000 feet was from the south at about 15 knots. RAOB did not identify any moderate or greater clear air turbulence in the atmosphere. The most-unstable Convective Available Potential Energy (CAPE)

¹ UTC - abbreviation for Coordinated Universal Time

² The GDAS is the system used by the Global Forecast System model to place observations into a gridded model space for the purpose of starting, or initializing, weather forecasts with observed data.

³ Coordinates used for the model were latitude: 14.96; longitude: -78.55.

parameter was 3,269 Joules/kilogram (from 1008 hectopascals [hPa]). The Lifting Condensation Level (LCL) was at 1,571 feet and the Level of Free Convection (LFC) was at 1,592 feet. The tropopause was located above 45,000 feet.

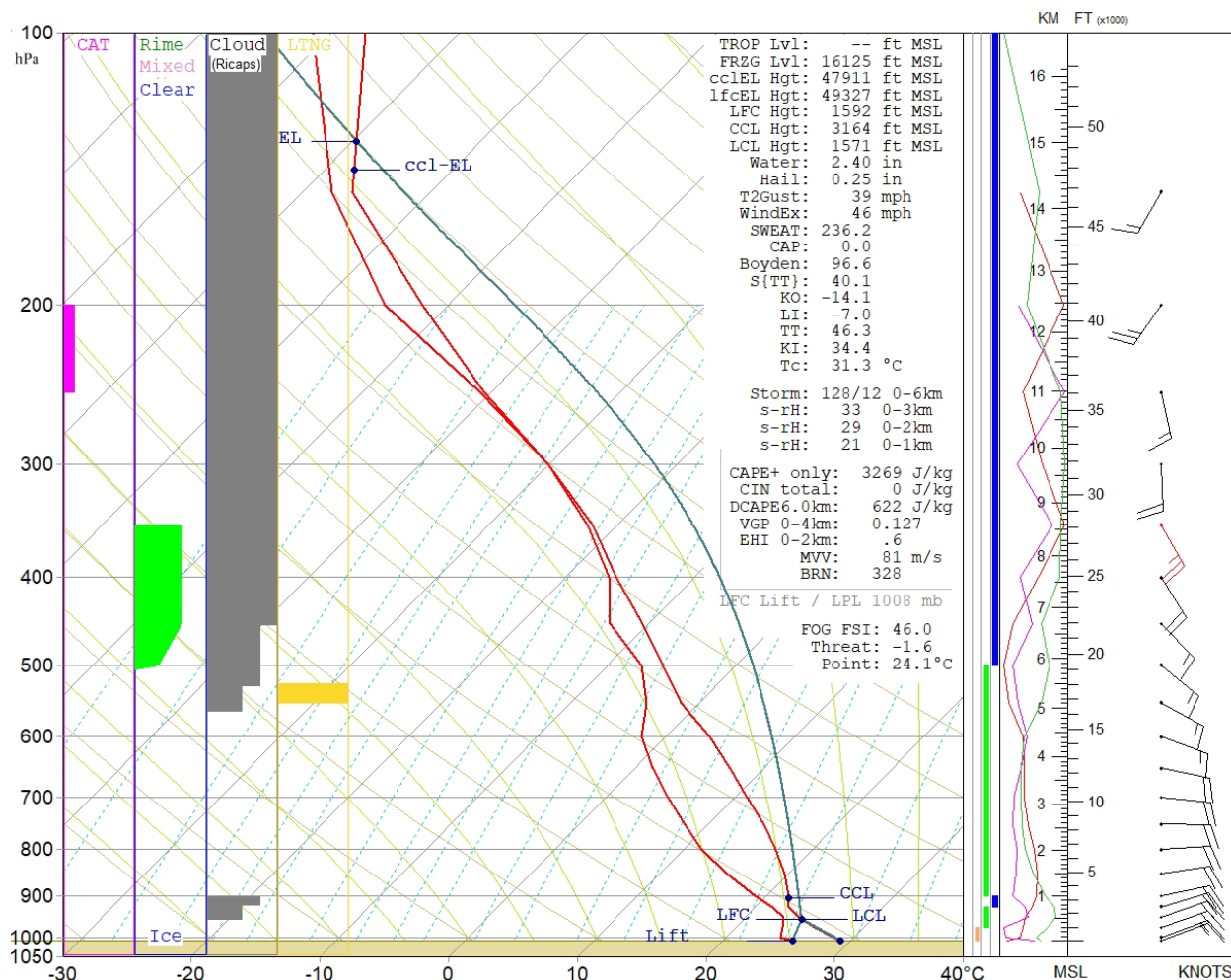


Figure 1 - GDAS model sounding data in SkewT/LogP format for 0500 near the accident site, surface to 100 hPa.

2.0 Satellite Imagery

Geostationary Operational Environmental Satellite (GOES)-16 infrared (10.3 μ m) data were obtained from an archive at the Space Science Engineering Center at the University of Wisconsin-Madison. Images from these data at 0340 are presented in Figures 2 and 3. Figure 2 presents a regional view of cloud coverage. The accident location is coincident with a cloud pattern consistent with convective activity. Figure 3 presents a closer view of the accident location. An approximately 2-minute portion of the accident aircraft's flight path (south-to-north) across the cloud pattern consistent with convective activity reveals that the accident aircraft flew across the coldest portion

of the cloud, which was at a brightness temperature of -55°C . According to the GDAS sounding, this temperature corresponded to a cloud top height of about 42,000 feet.

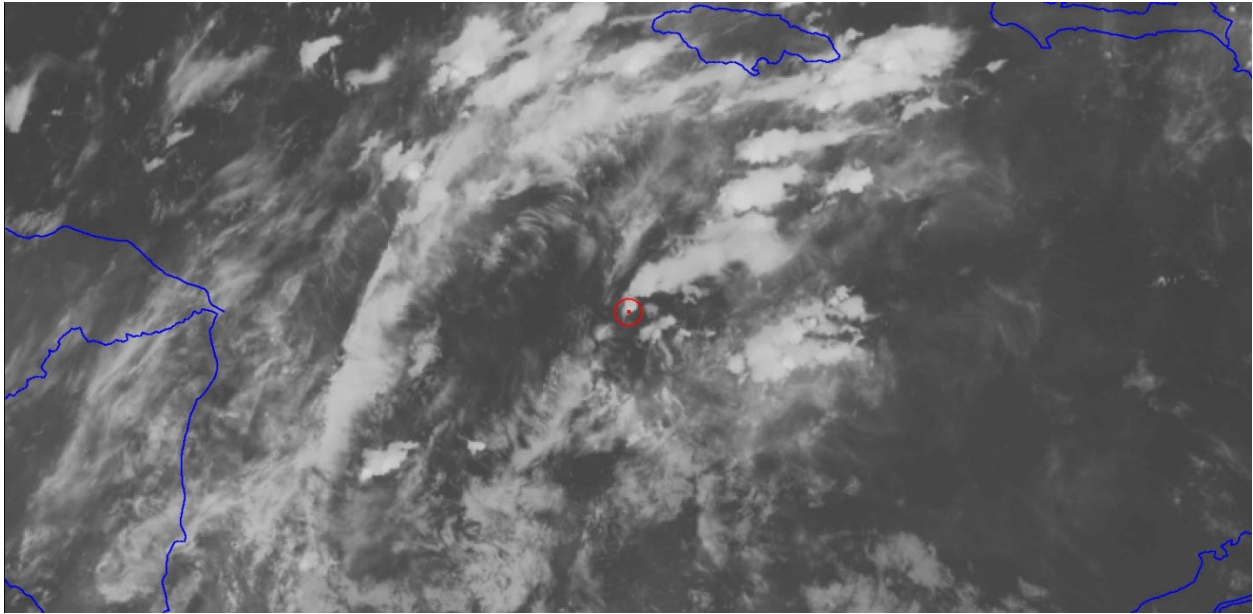


Figure 2 - GOES-16 infrared imagery from 0340. Image is not corrected for parallax error. The accident location is denoted by the red dot inside the red circle.

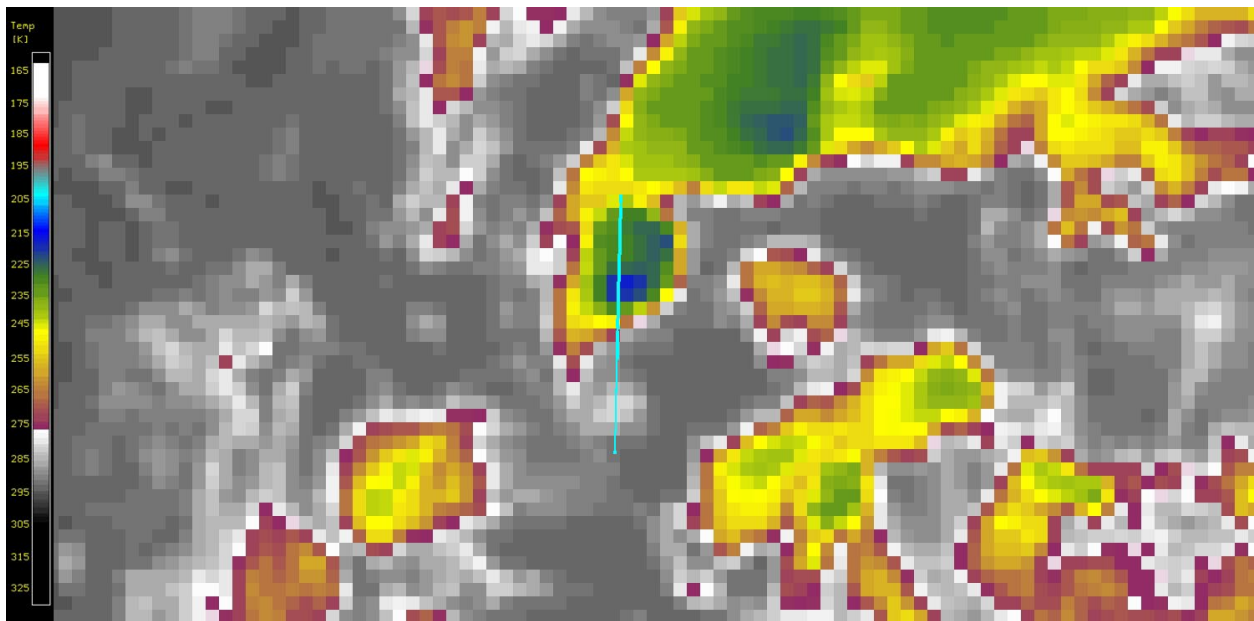


Figure 3 - GOES-16 infrared imagery from 0340. Image is not corrected for parallax error. An approximately 2-minute portion of the accident aircraft's flight path (south-to-north) is depicted by the light blue line.

3.0 Lightning

A review of the Earth Networks Total Lightning Network (ENTLN) lightning database revealed no flash total lightning activity in the 10 minutes preceding and 4 minutes following the accident time within 20 miles of the accident location.

4.0 SIGMETs

There were no Significant Meteorological Information (SIGMET) advisories issued by a Meteorological Watch Office that were active for the accident location at the accident time.

5.0 Area Forecast Discussion

At 2330 on 24 September 2023, the National Weather Service's Aviation Weather Center issued the following Area Forecast applicable to the accident site, which was in the far northeastern portion of the Panama Flight Information Region (FIR) near the southern portion of the Kingston FIR and the northwestern portion of the Barranquilla FIR.

*FACA20 KKCI 250330
OFAMKC
INTERNATIONAL OPERATIONS BRANCH
AVIATION WEATHER CENTER KANSAS CITY MISSOURI
VALID 250400-251600
OUTLOOK...251600-260400
ATLANTIC S OF 32N W OF 57W...CARIBBEAN...GULF OF MEXICO BTN 22N
AND 24N.
ALL WINDS SFC. TS IMPLY SEV OR GTR TURB SEV ICE LLWS AND IFR CONDS.
SFC TO 400MB.
SYNOPSIS...SFC TROF IS LOCATED IN ERN GLFMEX HOUSTON FIR SEWD
THRU THE NRN MERIDA FIR AND CONTINUES SEWD TO FAR WRN PTNS OF
THE PANAMA FIR. THIS FEATURE IS TRIGGERING CNVTV ALG AND AHD OF
TH SFC TROF INTO THE HABANA AND THE NERN CNTRL AMER FIR. WHILE A
TRPCL WV ALG 73W AND S 22N IS MOVG WWD 10-15KT DURG FCST PD.
THIS WV COUPLED WITH THE SFC TROF WL PRODUCE WIDESPREAD CNVTV
THRU THE SRN CARIB THRU THE KINGSTON...PANAMA AND NRN
BARRANQUILLA FIRS BY THE END OF FCST PD. THE TRADE WINDS WL HAVE
FRESH TO MOD ERLY WINDS THRU SRN CARIB FCST PD.
SIGNIFICANT CLD/WX...*

NRN BARRANQUILLA FIR...NRN PANAMA FIR
SCT025 SCT050. OCNL BKN050. LYRD TOPS ABV FL240. ISOL SHRA/TSRA.
BECMG 0809 SCT025 BKN050 OVC080. OCNL BKN025 TOPS ABV FL240.
SCT-NMRS SHRA/SCT TSRA. OCNL VIS 3-5SM RA BR. E WND 20KT.
OTLK...MVFR CIG SHRA TSRA WND.

KINGSTON FIR

N 16N...SCT025 BKN050. LYRD TOPS ABV FL240. WDLY SCT SHRA. ISOL TO
SCT TSRA. BECMG 0810. SCT025 BKN050 OVC080. OCNL BKN025 TOPS ABV
FL240. SCT SHRA/ISOL TO SCT TSRA. OTLK...VFR OCNL MVFR CIG SHRA
TSRA.

ELSW...SCT025 BKN050. LYRD TOPS ABV FL240. WDLY SCT SHRA. ISOL TO
SCT TSRA. WND E 20KT. BECMG 1012. SCT025 BKN050 OVC080. OCNL
BKN025 TOPS ABV FL240. SCT-NMRS SHRA/SCT TSRA. OCNL VIS 3-5SM RA
BR. WND E 20KT. OTLK...MVFR CIG SHRA TSRA WND.

6.0 Lunar Data

According to NOAA⁴, sunset on 24 September 2023 occurred at 1909 and sunrise on the accident day occurred at 0703. According to mooncalc.org⁵, on the accident day and relative to a point on the earth's surface below the accident location, moonset occurred at 0303 and at the time of the accident the center of the moon's disk was about 8° below the horizon at an azimuth of 247°.

Submitted by:

Mike Richards
Senior Meteorologist

⁴ <https://gml.noaa.gov/grad/solcalc/>

⁵ <https://www.mooncalc.org/#/14.9555,-78.5464,3/2023.09.25/02:36/1/2>