



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

May 20, 2022

Specialist's Factual Report

METEOROLOGY

ERA22FA226

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A. ACCIDENT

Location: Miami, Florida
Date: May 14, 2022
Time: 1251 eastern daylight time (1651 UTC¹)
Aircraft: Type – Cessna 172H; Registration – N8845Z

B. METEOROLOGIST

Mike Richards
Senior Meteorologist
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 for May 14, 2022 (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: 25.900583° north latitude; 80.124667° west longitude at an elevation of about 45 feet.

This report provides information on conditions conducive to carburetor icing.

¹ UTC – abbreviation for Coordinated Universal Time

D. WEATHER INFORMATION

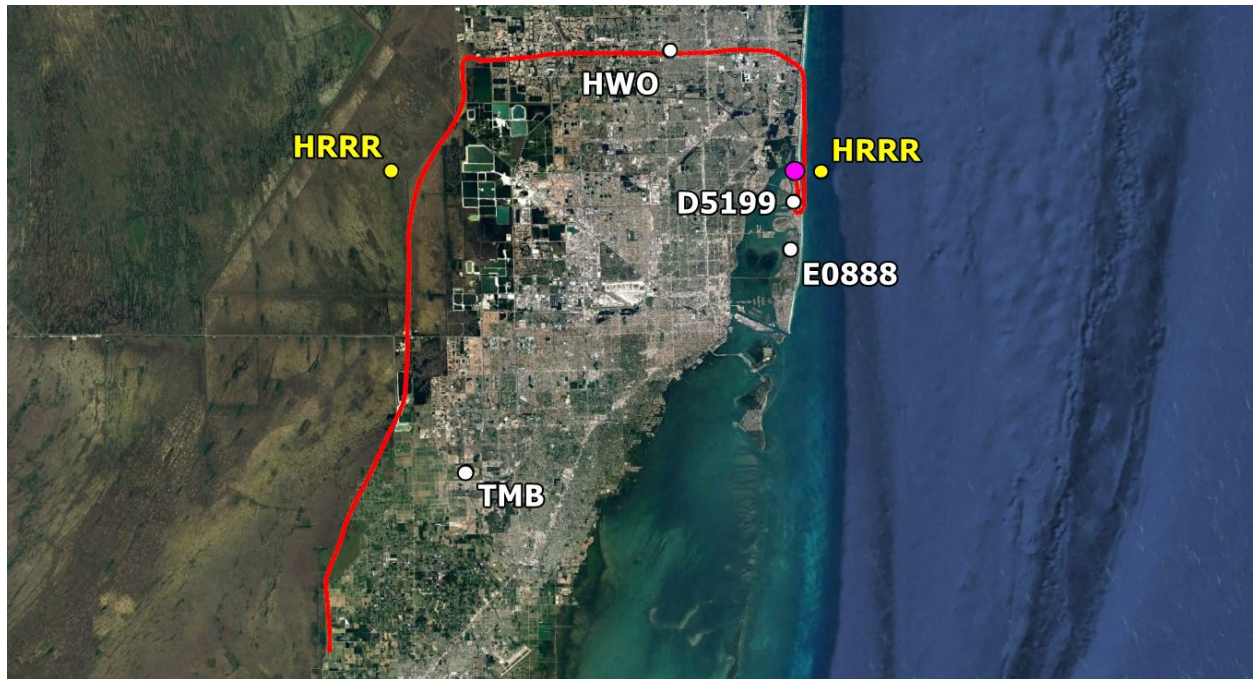


Figure 1 – Map of surface observation and model data locations presented in this report. Accident aircraft’s flight path is presented as the red line. Accident location is denoted by the pink circle.

1.0 Surface Observations

An Automated Surface Observing System (ASOS) was located at Miami Executive Airport (TMB²) which was in Miami, Florida, and was 22 miles southwest of the accident location at an elevation of about 10 feet. Automated and augmented longline³ reports from the TMB ASOS during the times surrounding the accident time are presented here.

[1053 EDT] METAR KTMB 141453Z AUTO 07004KT 10SM FEW027 28/21 A2997
RMK AO2 SLP147 T02830211 50006 \$=

[1153 EDT] METAR KTMB 141553Z 08006KT 10SM BKN040 BKN050 29/21 A2996
RMK AO2 SLP145 T02890206 \$=

² This report uses the 3-digit International Air Transport Association format for airport identification, which does not use the geographic designating digit (e.g., “K” for stations in the continental U.S. and “P” for U.S. stations in Alaska and the Pacific region) as found in the 4-digit International Civil Aviation Organization (ICAO) identifier format. Weather observations from airports in this report are referenced by their reporting station’s identifier (using ICAO format that includes the geographic designating digit), not by the airport at which the reporting station is located.

³ “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.

[1253 EDT] METAR KTMB 141653Z 16005KT 10SM BKN038 BKN049 OVC060
29/21 A2996 RMK AO2 SLP144 T02940206 \$=

At 1053 EDT, TMB reported an air temperature of 28° Celsius (C) and a dew point temperature of 21°C. These conditions represented a relative humidity of about 58 percent. At 1153 and 1253 EDT, TMB reported an air temperature of 29°C and a dew point temperature of 21°C, which represented a relative humidity of about 55 percent.

An ASOS was located at North Perry Airport (HWO) which was in Hollywood, Florida, and was about nine miles northwest of the accident location at an elevation of about 10 feet. Augmented longline reports from the HWO ASOS during the times surrounding the accident time are presented here.

[1053 EDT] METAR KHOW 141453Z VRB03KT 10SM CLR 29/19 A2998 RMK AO2
SLP152 T02940189 50005 \$=

[1153 EDT] METAR KHOW 141553Z 14004KT 10SM CLR 29/19 A2997 RMK AO2
SLP148 T02940189 \$=

[1253 EDT] METAR KHOW 141653Z 11007KT 10SM BKN045 OVC055 29/19 A2996
RMK AO2 SLP146 T02940189 \$=

At 1053, 1153 and 1253 EDT, HWO reported an air temperature of 29°C and a dew point temperature of 19°C. These conditions represented a relative humidity of about 55 percent.

Unofficial meteorological reporting station D5199 (data courtesy of MesoWest⁴) was located about 1.5 miles south of the accident site at an elevation of 3 feet. Type, calibration, maintenance, and siting standards of this instrument, as well as the overall quality of the data, are not known. Reporting of certain parameters⁵ from D5199 during the times (in EDT) surrounding the accident time are presented here:

<u>Time</u>	<u>Temp</u>	<u>D_Temp</u>	<u>RH</u>
1145	29	23	69
1200	29	23	67
1215	30	23	66
1230	31	23	65
1245	31	24	65
1300	31	24	66

Unofficial meteorological reporting station E0888 (data courtesy of MesoWest) was located about 4 miles south of the accident site at an elevation of 20 feet. Type, calibration, maintenance, and siting standards of this instrument, as well as the overall quality of the data, are not known.

⁴ <https://mesowest.utah.edu>

⁵ Temp=air temperature (degrees Celsius[°C]); D_Temp=dew point temperature (°C); RH=relative humidity (%)

Reporting of certain parameters from E0888 during the times (in EDT) surrounding the accident time are presented here:

<u>Time</u>	<u>Temp</u>	<u>D_Temp</u>	<u>RH</u>
1215	31	24	65
1220	31	24	64
1225	31	24	65
1231	31	23	63
1235	31	24	64
1240	31	24	65
1245	31	24	67
1250	31	24	65
1255	31	24	65
1301	32	24	64

2.0 HRRR Model Sounding

A High-Resolution Rapid Refresh (HRRR) model⁶ sounding (figure 2) for along the western side of the accident aircraft's flight path⁷ at 1200 EDT using an elevation of msl was retrieved from the National Oceanic and Atmospheric Administration's Air Resources Laboratory and analyzed by the RAWinsonde OBServation (RAOB) program. Temperature, dew point temperature and relative humidity for various heights (in feet) above the surface were calculated by the model and are presented below. In addition, calculations made by the RAOB program identified light carburetor icing conditions from the surface to about 600 feet and moderate carburetor icing conditions above about 600 feet to about 4,300 feet.⁸

<u>Feet</u>	<u>Temp</u>	<u>D_Temp</u>	<u>RH</u>
0	30.7	20.3	54
29	29.5	18.7	52
116	28.7	19.0	56
261	28.1	18.5	56
553	27.2	18.3	58
965	25.8	18.0	62
1470	24.0	17.6	67
2133	22.1	17.2	74

⁶ The HRRR is a NOAA real-time three-kilometer resolution, 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.

⁷ Coordinates used for the model were latitude: 25.9; longitude: -80.5

⁸ RAOB's methodology for classifying carburetor icing severity can be found here: <https://www.raob.com/pdf/RAOB69UserManual.pdf>

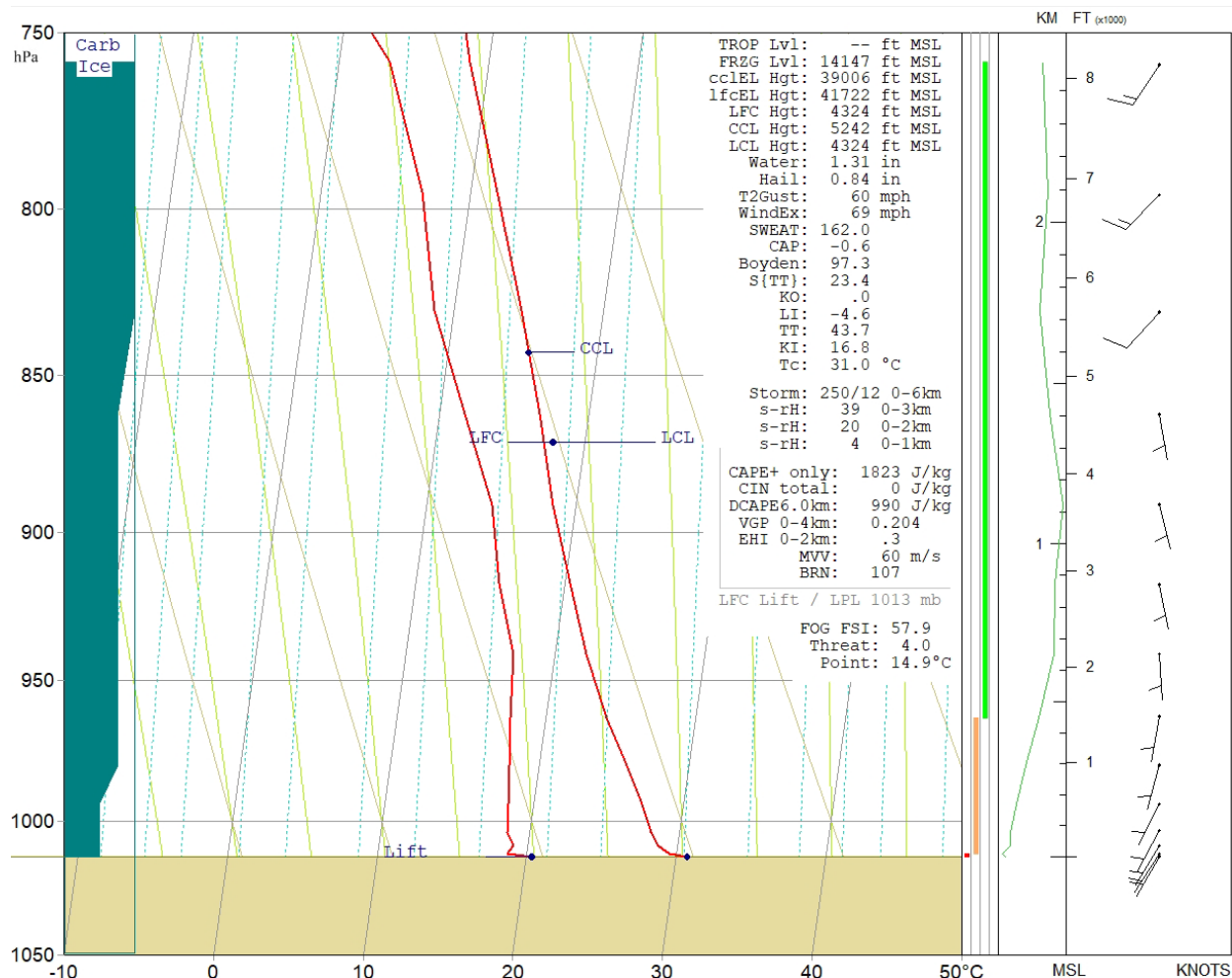


Figure 2 – HRRR model sounding data in SkewT/LogP format for 1200 EDT near the accident site, surface to 750 hectopascals (hPa).

A HRRR model sounding (figure 3) for near the accident site⁹ at 1300 EDT using an elevation of msl was retrieved from the National Oceanic and Atmospheric Administration’s Air Resources Laboratory and analyzed by the RAOB program. Temperature, dew point temperature and relative humidity for various heights (in feet) above the surface were calculated by the model and are presented below. In addition, calculations made by the RAOB program identified light carburetor icing conditions from the surface to about 200 feet and moderate carburetor icing conditions above about 200 feet to about 5,000 feet.

Feet	Temp	D. Temp	RH
0	25.4	22.8	86
29	25.4	22.4	83
115	25.1	22.7	87

⁹ Coordinates used for the model were latitude: 25.9; longitude: -80.1

hPa

750

800

850

900

950

1000

1050

Carb

Ice

Lift

LCL

LFC

CCL

TROP Lvl: -- ft MSL

FRAG Lvl: 14045 ft MSL

cclEL Hgt: 39212 ft MSL

lfcEL Hgt: 42109 ft MSL

LFC Hgt: 3596 ft MSL

CCL Hgt: 5519 ft MSL

LCL Hgt: 1102 ft MSL

Water: 1.31 in

Hail: 0.89 in

T2Gust: 45 mph

WindEx: 48 mph

SWEAT: 175.0

CAP: 1.8

Boyden: 97.1

S(TT): 25.0

KO: .0

LI: -5.0

TT: 44.9

KI: 18.3

Tc: 31.6 °C

Storm: 251/12 0-6km

s-rH: -27 0-3km

s-rH: -24 0-2km

s-rH: -23 0-1km

CAPE+ only: 2006 J/kg

CIN total: -38 J/kg

DCAPE6.0km: 1047 J/kg

VGP 0-4km: 0.239

EHI 0-2km: .0

MVV: 63 m/s

BRN: 72

FOG FSI: 32.4

Threat: .9

Point: 18.4°C

LFC Lift / LPL 1015 mb

KM

FT (x1000)

8

7

2

6

5

4

1

3

2

1

MSL

KNOTS

Submitted by:

Mike Richards
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