



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

March 20, 2018

Weather Study

METEOROLOGY

CEN17FA084

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A. ACCIDENT

Location: San Antonio, Texas
Date: January 25, 2017
Time: 1540 central standard time (CST)
2140 universal coordinated time (UTC)
Airplane: Cirrus SR22; Registration: N410SC

B. METEOROLOGIST

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C. SUMMARY

On January 25, 2017, about 1540 central standard time, a Cirrus Design SR22 airplane, N401SC, was substantially damaged during an in-flight collision with trees and terrain about one mile southeast of the Stinson Municipal Airport (SSF), San Antonio, Texas. The pilot was fatally injured. The airplane was registered to and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed for the flight, which was not operated on a flight plan. The flight originated from the San Antonio International Airport (SAT) about 1532.

D. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's (NTSB) 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 central standard time (CST) based upon the 24-hour clock on January 25, 2017, local time is +6 hours to UTC, and UTC=Z. Directions are referenced to true north and distances in nautical miles. Heights are in feet 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 29.326944° North and longitude 98.458056° West, at an elevation of approximately 570 ft.

E. WEATHER INFORMATION

1.0 Surface Analysis Chart

The NWS southcentral portion of the Surface Analysis Chart¹ for 1500 CST (2100Z) on January 25, 2017 is included as figure 1 with the approximate accident site marked by a red star. The chart depicted a cold front to the southeast of the accident site off the Texas Gulf of Mexico coast and extending across Louisiana, Mississippi, into Tennessee. A low-pressure system at 1012-hectopascals (hPa) was located over northern New Mexico associated with a trough of low pressure which extended southeastward into western and central Texas. The station models over Texas surrounding the accident site depicted northerly winds at 10 to 15 knots, clear skies below 12,000 feet agl, with temperatures in the 70's degrees Fahrenheit (°F), with dew point temperatures in the 20's (°F). No restrictions to visibility or any precipitation were depicted over southern Texas.

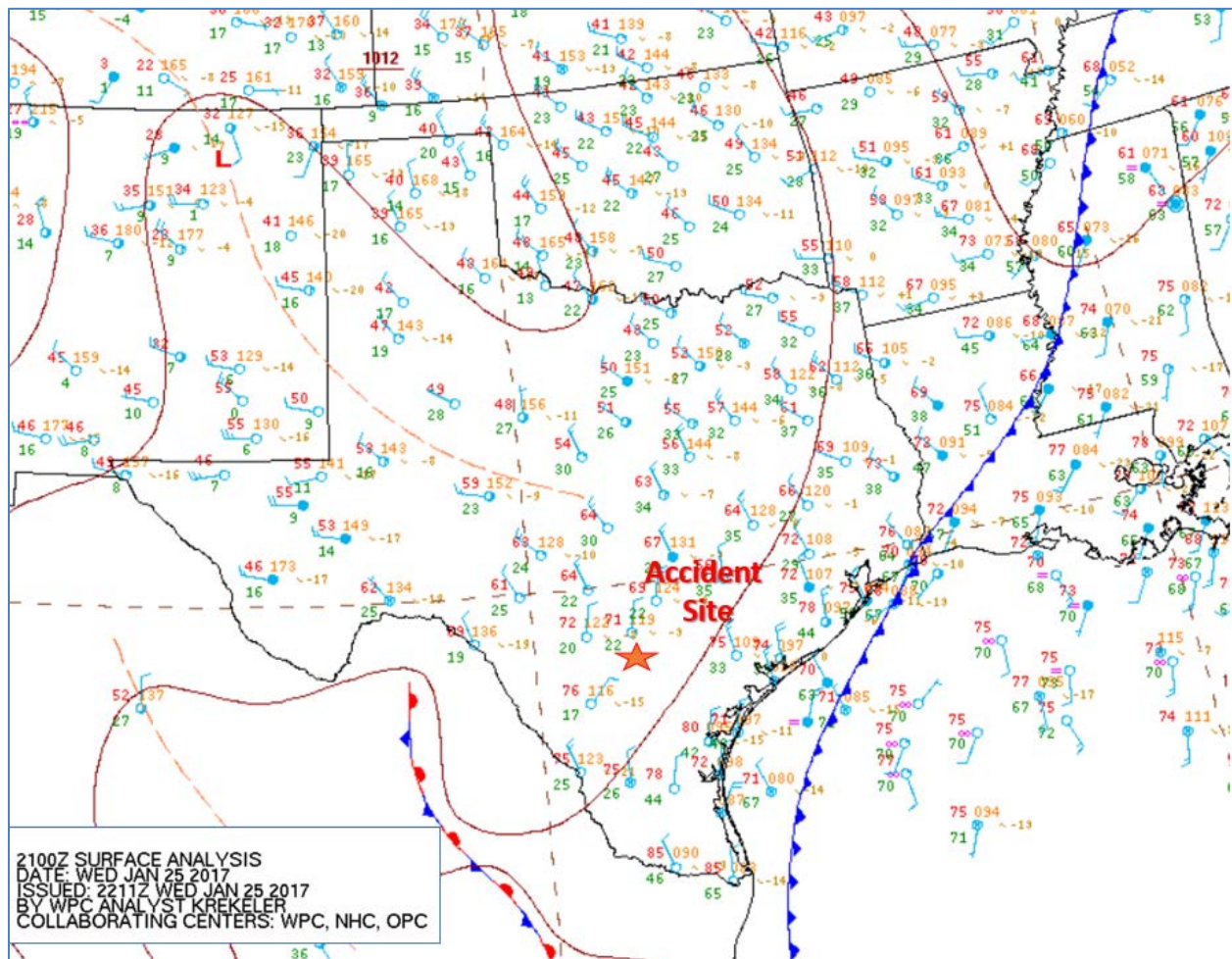


Figure 1 - Southcentral section of the Surface Analysis Chart for 1500 CST

¹ Reference to these charts can be found in the joint NWS and Federal Aviation Administration (FAA) Advisory Circular "Aviation Weather Services", AC 00-45H.

2.0 Observation

The Stinson Municipal Airport (KSSF), San Antonio, Texas at an elevation of 577 feet and a magnetic variation of 8° E, had a federally installed and maintained Automated Surface Observation System (ASOS), which was augmented by certified weather observers during the period. The following conditions were reported surrounding the time of the accident:

KSSF weather observation at 1453 CST, wind from 010° at 9 knots, visibility 10 miles or more, sky clear below 12,000 feet agl, temperature 22° Celsius (C), dew point -6° C, altimeter 29.90 inches of mercury (Hg).

KSSF weather observation at 1553 CST, wind from 010 at 12 knots, visibility 10 miles or more, sky clear below 12,000 feet agl, temperature 21° C, dew point -6° C, altimeter 29.92 inches of Hg.

No gusts or variations of 10 knots or more, or any peak gusts to 25 knots were noted from 1453 through 1753 CST. The raw observation surrounding that period were as follows:

METAR KSSF 251653Z 01009KT 10SM CLR 21/M05 A2992 RMK AO2 SLP125 T02111050 \$=

METAR KSSF 251753Z 36011KT 10SM CLR 23/M05 A2991 RMK AO2 SLP123 T02281050 10228 20167 50015 \$=

METAR KSSF 251853Z 02009KT 10SM CLR 23/M05 A2990 RMK AO2 SLP120 T02281050 \$=

METAR KSSF 251953Z 35009G18KT 10SM CLR 23/M05 A2989 RMK AO2 SLP115 T02281050 \$=

METAR KSSF 252053Z 01009KT 10SM CLR 22/M06 A2990 RMK AO2 SLP119 T02171056 55003=

Accident 2140Z

METAR KSSF 252153Z 01012KT 10SM CLR 21/M06 A2992 RMK AO2 SLP126 T02111061=

METAR KSSF 252253Z 36012KT 10SM CLR 20/M06 A2995 RMK AO2 SLP135 T02001056=

SPECI KSSF 252258Z 01010KT 10SM CLR 20/M05 A2995 RMK AO2 T02001050=

METAR KSSF 252353Z 02007KT 10SM CLR 19/M04 A2997 RMK AO2 SLP143 T01941039 10233 20189 53023=

3.0 Terminal Aerodrome Forecast

The NWS Austin/San Antonio (KEWX) Weather Forecast Office located in New Braunfels, Texas was responsible for the San Antonio area and the Terminal Aerodrome Forecast (TAF) for the airport. The forecast current at the time was as follows:

***TAF KSSF 251726Z 2518/2618 01012KT P6SM SCT080 BKN250
FM260000 35004KT P6SM FEW080 BKN250
FM261600 06006KT P6SM SCT090 BKN250=***

The forecast expected from 1200 through 1800 CST wind from 010° at 12 knots, visibility better than 6 miles, scattered clouds at 8,000 feet agl, ceiling broken at 25,000 feet.

A High Resolution Rapid Refresh (HRRR)² numerical model data was obtained from the NOAA Air Resource Laboratory initial model run at 1200 CST for conditions valid for 1600 CST over the accident site coordinates. The data was plotted on a standard skew T log P diagram³ using RAOB software⁴ from the surface to 500-hPa or approximately 18,000 ft, and is included as figure 2.

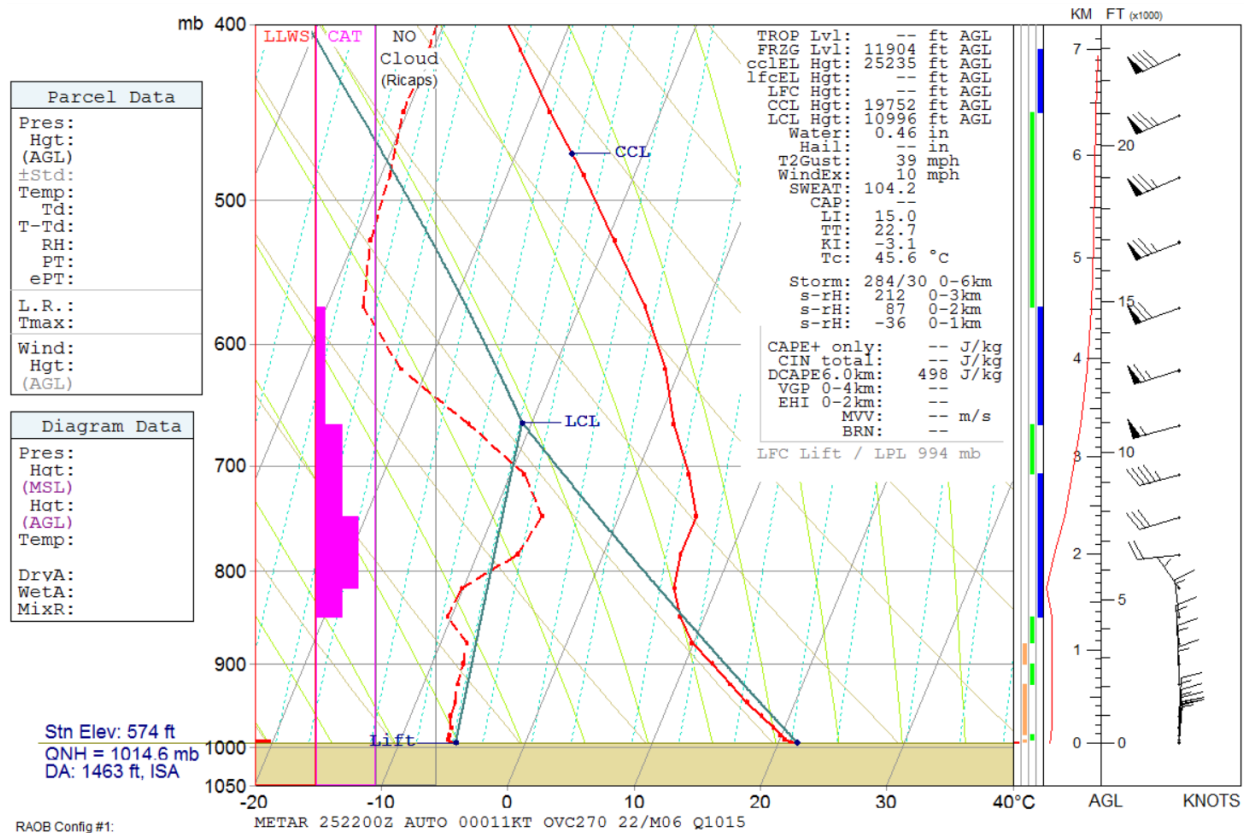


Figure 2 - HRRR numerical model sounding profile for 1600 CST

The HRRR sounding indicated a surface temperature of 21.5° C, a dew point of -5.5° C, with a relative humidity of 16%. The lifted condensation level (LCL)⁵ was at 10,996 feet agl, and the

² HRRR – High-Resolution Rapid Refresh (HRRR) is a NOAA real-time 3-kilometer (km) resolution, hourly-updated, cloud-resolving, convection-allowing atmospheric model, initialized by 3-km grids with 3-km radar assimilation. Radar data is assimilated in the HRRR every 15 minutes over a 1-hour period.

³ 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.

⁴ 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.

⁵ Lifting Condensation Level (LCL) - The height at which a parcel of moist air becomes saturated when it is lifted dry adiabatically.

convective condensation level (CCL)⁶ was at 19,752 feet agl. The precipitable water value was 0.46 inches. The freezing level was identified at about 12,500 feet. The wind profile indicated a forecast surface wind from 004° at 11 knots with wind direction from the north through 6,000 feet with wind backing abruptly to the west and west-southwest with height and winds speeds increasing above 50 knots above 10,000 feet. The mean 0 to 6 kilometer or 18,000 feet wind was from 255° at 41 knots, with the maximum wind from 245° at 107 knots at 34,300 feet. The RAOB sounding analysis program indicated a high probability (greater than 90%) of moderate to severe turbulence between the layers from 4,300 through 10,000 feet, due to strong vertical wind shears and the wind backing from the north to the west in that layer.

A table of the HRRR model data of height, pressure (Pres), temperature (T), dew point temperature (Td), relative humidity in percent (RH), wind direction (DD) and wind speed (FF), and RAOB derived clear air turbulence (CAT), and low-level wind shear (LLWS) from the surface through 11,500 feet is included in figure 3.

Height (ft-MSL)	Pres (mb)	T (C)	Td (C)	RH (%)	DD / FF (deg / kts)	CAT (FAA)	LLWS
574	994	21.5	-5.5	16	4 / 11		
603	993	21.0	-6.0	16	4 / 11		LIGHT
689	990	20.4	-6.2	16	4 / 13		
861	984	19.9	-6.3	16	3 / 13		
1120	975	19.1	-6.4	17	2 / 14		
1526	961	17.8	-6.8	18	2 / 15		
2024	944	16.2	-6.9	20			
2648	923	14.3	-7.3	22	358 / 15		
3374	899	12.2	-7.5	25	357 / 15		
4083	876	9.9	-7.9	28	355 / 15		
4997	847	8.1	-10.3	26	353 / 15	MDT	
5970	817	6.7	-10.1	29	328 / 7	SVR	
7114	783	6.1	-6.8	39	263 / 18	SVR	
8415	746	6.1	-6.1	41	252 / 32	MDT	
9853	707	4.1	-8.9	38	253 / 44	MDT	
11519	664	1.3	-14.9	29	254 / 56	LGT	

Figure 3 - HRRR model parameters and turbulence potential

5.0 Pilot Reports

A review of pilot reports (PIREPs) recorded over Texas during the period indicated only one report in the vicinity of the accident site.

SAT UA /OV 15 NW SAT/TM 1828/FL090/TP A320/TN MODERATE FROM 090 TO 075

An urgent report was noted about 320 miles south-southeast of the accident site in the vicinity of Childress Municipal Airport (KCDS) prior to the accident with the pilot reporting encountering moderate to severe turbulence at 15,000 feet. No other reports were noted at low-levels in the vicinity of San Antonio.

CDS UUA /OV CDS185020 /TM1727/FL150/TP BE33 /TB MOD-SVR/RM AWC-WEB

⁶ Convective Condensation Level (CCL) - The height to which a parcel of air, if heated sufficiently from below, will rise adiabatically until condensation starts. This is typically used to identify the base of cumuliform clouds, which are normally produced from surface heating and thermal convection.

6.0 Inflight Weather Advisories

A search of NWS inflight weather advisories indicated that the Aviation Weather Center had an Airmen's Meteorological Advisory (AIRMET) and a Significant Meteorology Advisory (SIGMET) current for the area for turbulence. However, only the AIRMET Tango was current for low-level turbulence applicable for the area and expected a potential for moderate turbulence below 18,000 feet and is depicted in figure 4. The SIGMET Uniform extended from 12,000 to 24,000 feet and was for severe turbulence associated with wind shear associated with the jet stream. The advisories are included below.

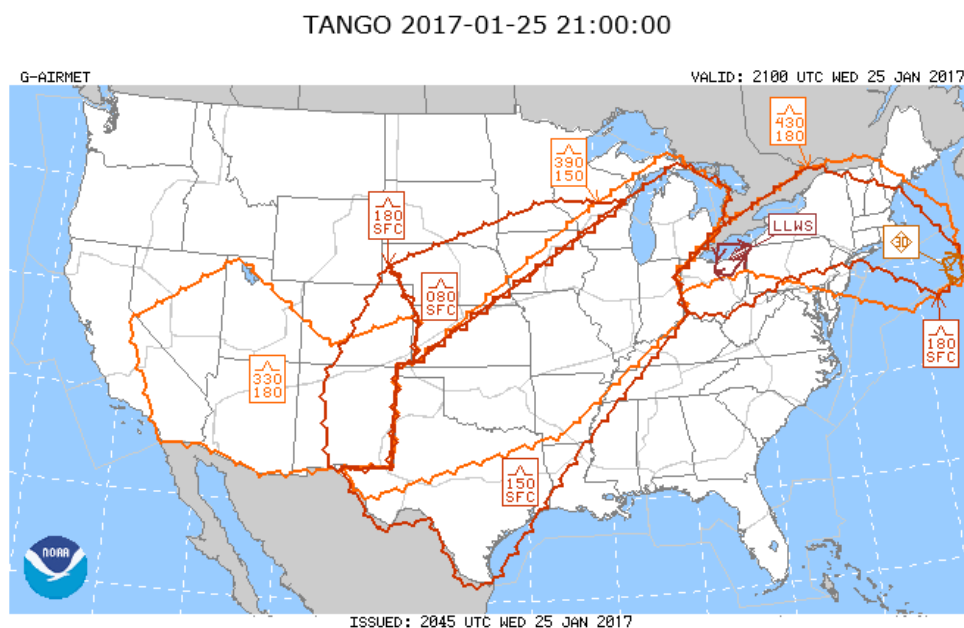


Figure 4 - AIRMET Tango for lo-level turbulence

WAUS44 KKKI 251445

WA4T

-DFWT WA 251445

AIRMET TANGO UPDT 3 FOR TURB VALID UNTIL 252100

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...SEE SIGMET UNIFORM SERIES...

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AIRMET TURB...OK TX AR TN MS AL SD NE KS MN IA MO WI LM LS MI LH IL IN KY
FROM YQT TO YVV TO 30SE ECK TO FWA TO CVG TO HNN TO HMV TO GQO TO LIT TO TXK
TO 40W MRF TO ELP TO INK TO 30ESE TBE TO 50W LBL TO 40ESE LAA TO YQT
MOD TURB BTN FL180 AND FL390. CONDS CONTG BYD 21Z THRU 03Z.

.

AIRMET TURB...OK TX AR TN LA MS NE KS IA MO WI LM MI LH IL IN KY AND CSTL WTRS
FROM 60SSW YVV TO 30ENE DXO TO FWA TO CVG TO BRO TO 90W BRO TO DLF TO 90S MRF
TO ELP TO INK TO 30ESE TBE TO 50NNE MMB TO DBQ TO 50ENE BAE TO 60SSW YVV
MOD TURB BLW FL180. CONDS CONTG BYD 21Z THRU 03Z.

.

OTLK VALID 2100-0300Z...TURB OK TX AR TN LA MS AL KS IA MO LM MI
IL IN KY AND CSTL WTRS

BOUNDED BY 60SSE GRR-FWA-CVG-HNN-HMV-20WSW GQO-40WNW MSL-40SSE
MLU-40SSE LCH-80E BRO-90W BRO-DLF-90S MRF-ELP-INK-30ESE TBE-50SE
ICT-BDF-60SSE GRR
MOD TURB BLW FL180. CONDS CONTG THRU 03Z.

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WSUS04 KPCI 251443
WS4U
-DFWU WS 251443
SIGMET UNIFORM 3 VALID UNTIL 251843
OK TX NE KS IA MO IL
FROM JOT TO 30SE OSW TO CDS TO 20SSE LBL TO DSM TO JOT
OCNL SEV TURB BTN 140 AND FL240. DUE TO WND SHR ASSOCD WITH JTST.
RPTD BY ACFT. CONDS CONTG BYD 1843Z.

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7.0 Winds and Temperature Aloft Forecast

The NWS Winds and Temperature Aloft Forecast current for flight planning use current at the time were as follows:

FD1US1
DATA BASED ON 251200Z
VALID 251800Z FOR USE 1400-2100Z. TEMS NEG ABV 24000
FT 3000 6000 9000 12000 18000 24000 30000 34000 39000
SAT 0318 2926+11 2644+08 2448+03 2465-12 2475-2 249139 259950 740052

Submitted by:

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