

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



HWY23FH005

METEOROLOGY

Specialist's Factual Report

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A. CRASH

Location: Louisville, St. Lawrence County, New York

Date: January 28, 2023

Time: 6:00 a.m. Eastern Standard Time

B. METEOROLOGY INVESTIGATOR

Mike Richards

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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 investigation and gathered all weather data remotely. Unless otherwise noted, all times are in eastern standard time for 28 January 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 site was located about: 44.90192° north latitude; 75.06092° west longitude.

This report provides information on snowfall during the 48 hours leading up to and including the day of the crash.

D. WEATHER INFORMATION

1.0 Surface Observations

An Automated Surface Observing Station (ASOS) was located at Massena International Airport-Richards Field (MSS¹), which was located about 9 miles east of the crash site at an elevation of about 220 feet. It had a magnetic variation of about 14° west. Automated five-minute reports produced by the MSS ASOS during the times surrounding the accident time are presented here, and the observation closest in time

¹ 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.

to the **crash** time is highlighted by bold text.² These five-minute reports were not available longline.³

[0545] 5-MIN KMSS 281045Z AUTO 20014KT 9SM FEW026 OVC037 00/M03
A2985 290 78 -1400 210/14 RMK AO2 SNE15B31E43 P0000 T00001033
TSNO \$

[0550] 5-MIN KMSS 281050Z AUTO 20013KT 10SM FEW024 OVC037 01/M03
A2986 280 75 -1300 210/13 RMK AO2 SNE15B31E43 SLP116 P0000
T00061033 TSNO \$

[0555] 5-MIN KMSS 281055Z AUTO 21015KT 3SM -SN SCT022 OVC036 01/M03
A2986 280 78 -1300 220/15 RMK AO2 SNB54 P0000 T00061028 TSNO \$

**[0600] 5-MIN KMSS 281100Z AUTO 21013KT 2SM -SN FEW021 SCT026
OVC036 00/M03 A2986 280 81 -1400 220/13 RMK AO2 SNB1054
P0000 T00001028 TSNO \$**

[0605] 5-MIN KMSS 281105Z AUTO 21016G21KT 3SM -SN SCT030 OVC038
00/M03 A2986 280 81 -1400 220/16G21 RMK AO2 SNB1054 P0000
T00001028 TSNO \$

At 0600, the MSS ASOS five-minute report indicated a wind from 210° at 13 knots, visibility of 2 statute miles, light snow, few clouds at 2,100 feet above ground level (agl), scattered clouds at 2,600 feet agl, ceiling overcast at 3,600 feet agl, temperature of 0° Celsius (C) and dew point temperature of -3°C, altimeter setting of 29.86 inches of mercury, pressure altitude of 280 feet, relative humidity of 81 percent, density altitude of -1,400 feet, magnetic wind direction of 220° with a wind magnitude of 13 knots; Remarks included: automated station with a precipitation discriminator, snow began at 0554, trace amount of liquid equivalent precipitation accumulation since 0553, temperature of 0.0°C and dew point temperature of -2.8°C, maintenance needed on the system.

Five-minute reports from the MSS ASOS from 1900 on 25 January 2023 through the **crash** time are presented in Attachment 1. Review of these data indicated that in about the 48 hours leading to the accident time (specifically, 0553 on 26 January 2023 through 0553 on 28 January 2023), the only precipitation type reported was snow, except for the period of 0605 through 0620 on 26 January 2023 when freezing rain

² Due to a communications issue at the MSS ASOS, hourly weather observations (METARs) and special reports (SPECIs) were not available for times surrounding the accident time.

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.

was reported. 0.02 inches of ice accretion was reported during the period of 0553 through 0653 on 26 January 2023. In addition, a trace amount of ice accretion was reported between 0553 and 0653 on 27 January 2023.

For the 6-hour and 12-hour periods leading to 0553 on the **crash** day, there was a trace amount of liquid equivalent precipitation accumulation. For the 24-hour and 48-hour periods leading to 0553 on the **crash** day, 0.01 inches and 0.06 inches of liquid equivalent precipitation accumulation were reported, respectively.

2.0 Weather Radar

WSR-88D⁴ Level-II base reflectivity weather radar imagery from the Montague, New York, site (KTYX) is presented in Figures 1 and 2. KTYX was located approximately 74 miles south-southwest of the accident location with an antenna elevation of about 1,960 feet. Assuming standard refraction and considering the 0.95° beam width⁵ for the WSR-88D radar beam, the KTYX 0.527° tilt would have “seen” altitudes above the accident location of between about 6,000 and 13,500 feet. No reflectivity was present over the accident site at 0559 (Figure 1), however an area of light reflectivity was located about 4 miles to the west. At 0606 (Figure 2), that area of light reflectivity was impacting the accident location from the west. A review of the KTYX WSR-88D Level-III 0.5° hydrometeor classification product for this time indicated this area of light reflectivity was “dry snow” and “ice crystals.”

⁴ Weather Surveillance Radar 88 Doppler (WSR-88D)

⁵ Here we define the angular width of the radar beam as the region of transmitted energy that is bounded by one-half the maximum power. The maximum power lies along the beam centerline and decreases outward from the radar antenna.

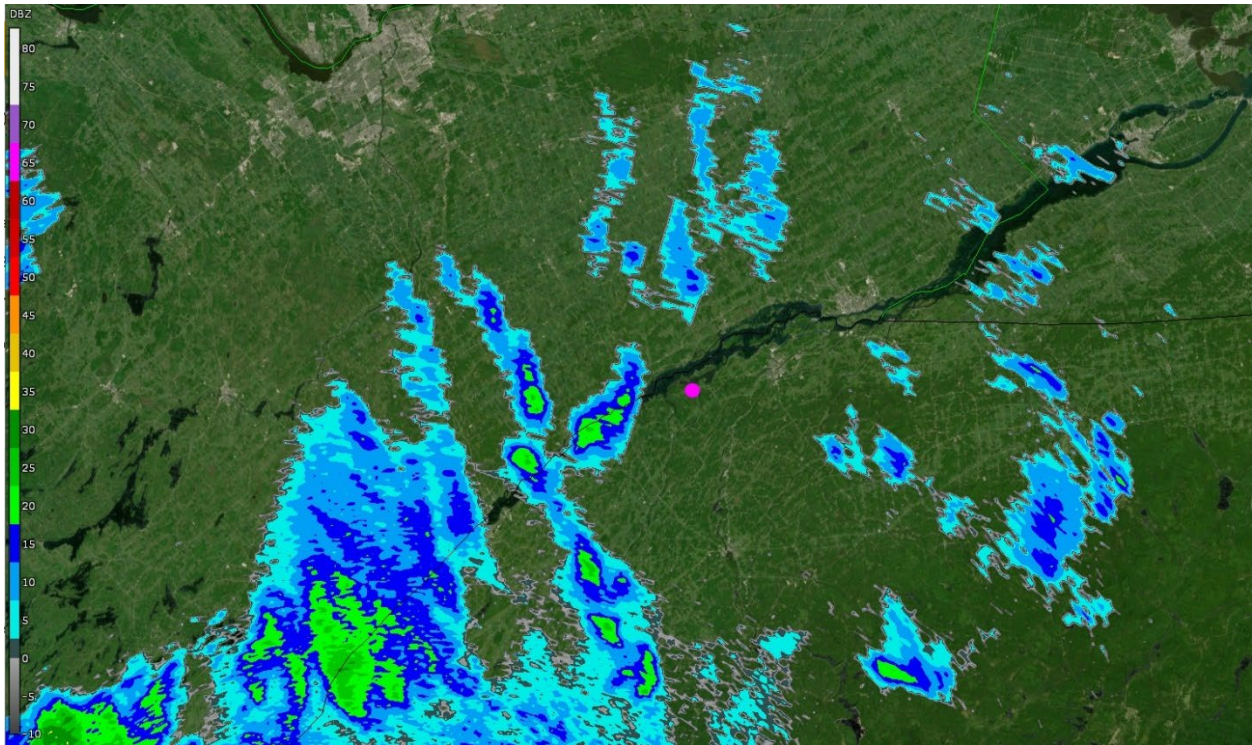


Figure 1 - KTYX 0.527° Level-II base reflectivity product from a sweep initiated at 0559:57. The crash location is depicted by the purple dot.

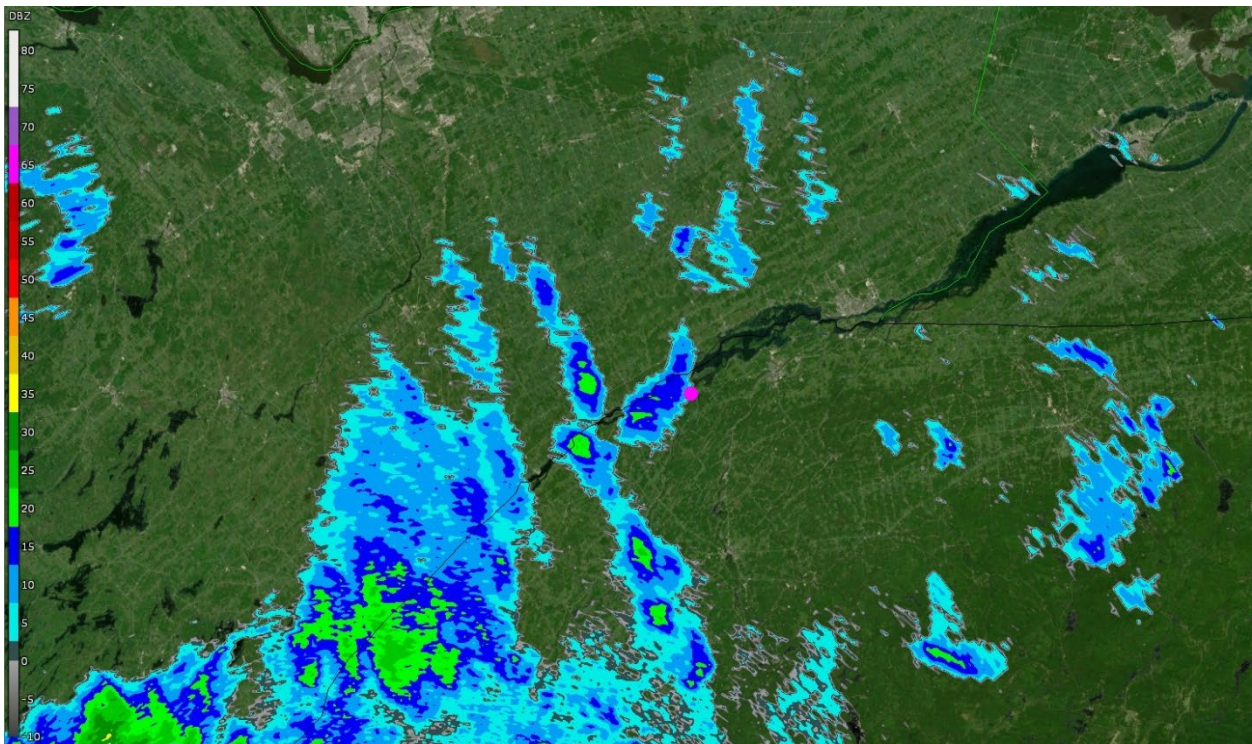


Figure 2 - KTYX 0.527° Level-II base reflectivity product from a sweep initiated at 0606:02. The crash location is depicted by the purple dot.

Dual-Pol Quantitative Precipitation Estimation (DQPE) imagery based on data retrieved from a radar (CASFT), which was located about 46 miles west of the accident location near Ottawa, Ontario, Canada, was retrieved from Environment Canada and is presented in Figure 3. This image depicts liquid equivalent snowfall rates in centimeters (cm) per hour. At 0600, the crash location was next to an area of snowfall rates of between 0.1 and 0.2 cm per hour. An area of higher liquid equivalent snowfall rates of between 1.0 and 1.5 cm per hour was located immediately to the west of the crash location and coincided with the area of light reflectivity to the west of the crash location in Figure 1.

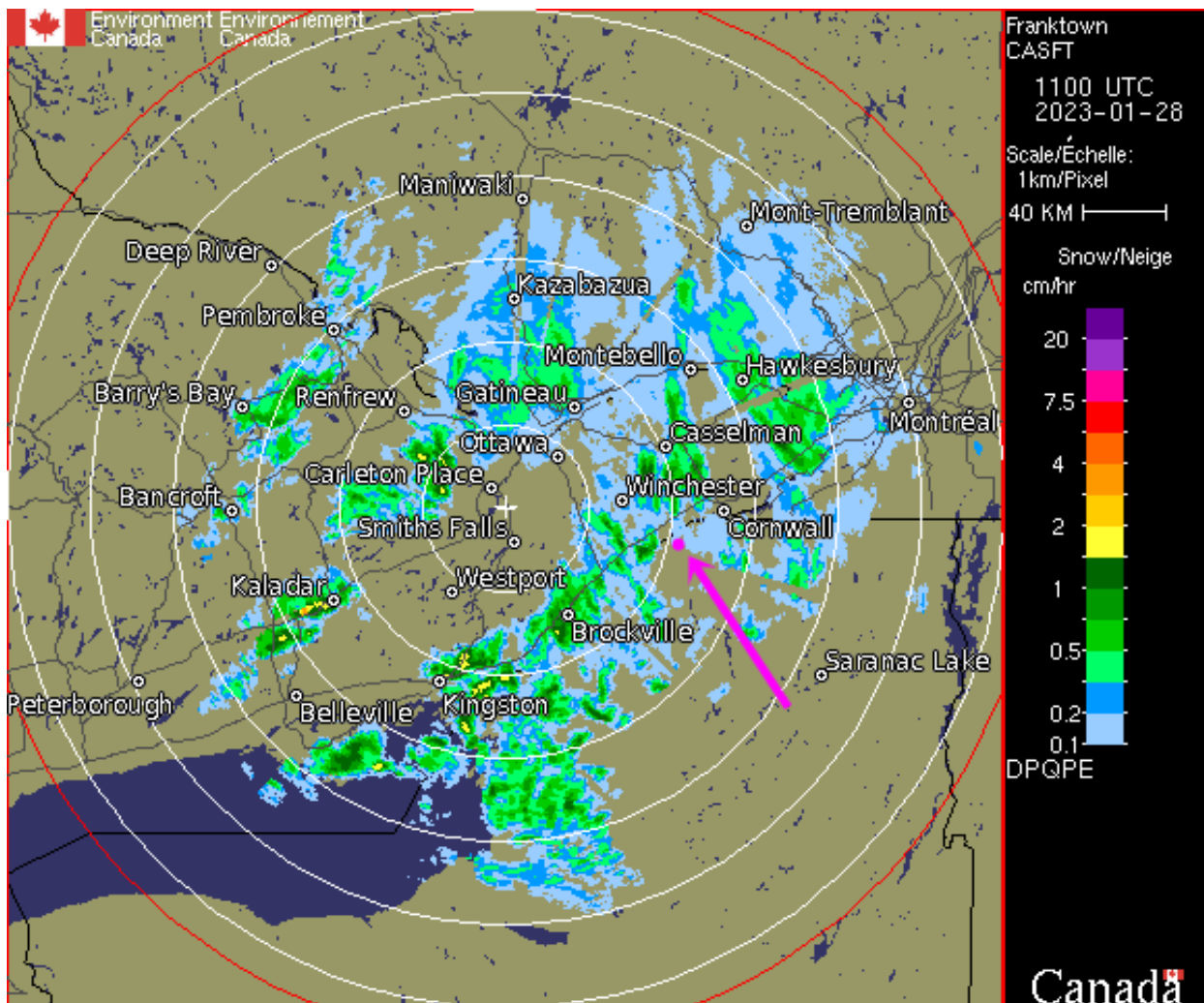


Figure 3 - CASFT DQPE imagery from 0600. The crash location is depicted by the purple dot.

3.0 MRMS

“Q3 Multi-Sensor” precipitation accumulation (Pass 2) imagery from the National Oceanic and Atmospheric Administration’s National Severe Storms Laboratory Multi-Radar/Multi-Sensor (MRMS) system⁶ is presented in Figures 4-7. These figures present liquid equivalent precipitation accumulation⁷ for various periods leading to 0600 on the crash day. For the 1-hour period leading to 0600 (Figure 4), the liquid equivalent precipitation accumulation at the crash location was between 0.0 and 0.02 inches. For the 3-hour, 6-hour and 12-hour periods leading to 0600 (Figure 5; only the image depicting the 3-hour total is presented), the liquid equivalent precipitation accumulation at the crash location was between 0.01 and 0.05 inches. For the 24-hour period leading to 0600 (Figure 6), the liquid equivalent precipitation accumulation at the crash location was between 0.02 and 0.1 inches. For the 48-hour period leading to 0600 (Figure 7), the liquid equivalent precipitation accumulation at the crash location was between 0.25 and 0.3 inches.

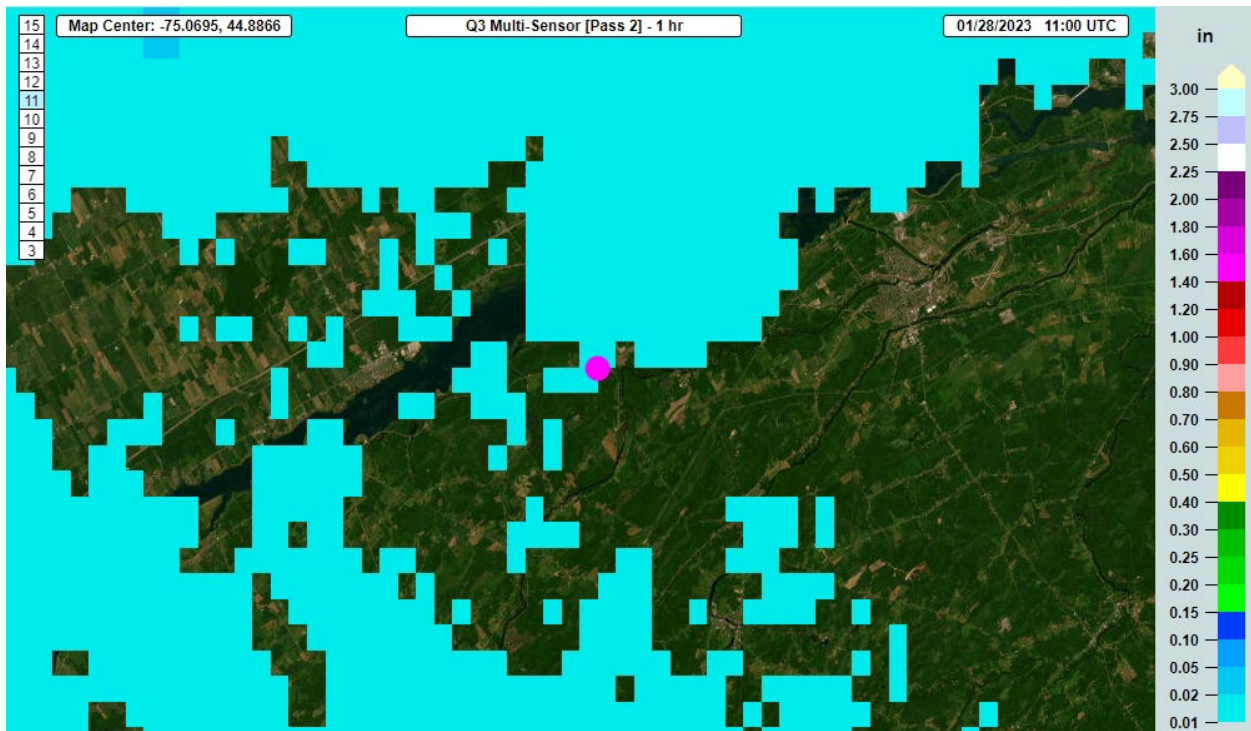


Figure 4 – MRMS Q3 Multi-Sensor 1-hour liquid equivalent precipitation accumulation (Pass 2) imagery valid at 0600. Crash location is depicted by the purple dot.

⁶ The MRMS is a system with fully-automated algorithms that quickly and intelligently integrate data streams from multiple radars, surface and upper air observations, lightning detection systems, satellite observations, and forecast models. See: <https://www.nssl.noaa.gov/projects/mrms/>

⁷ The MRMS system identified the precipitation type as “snow” for the 48 hours prior to the accident time.

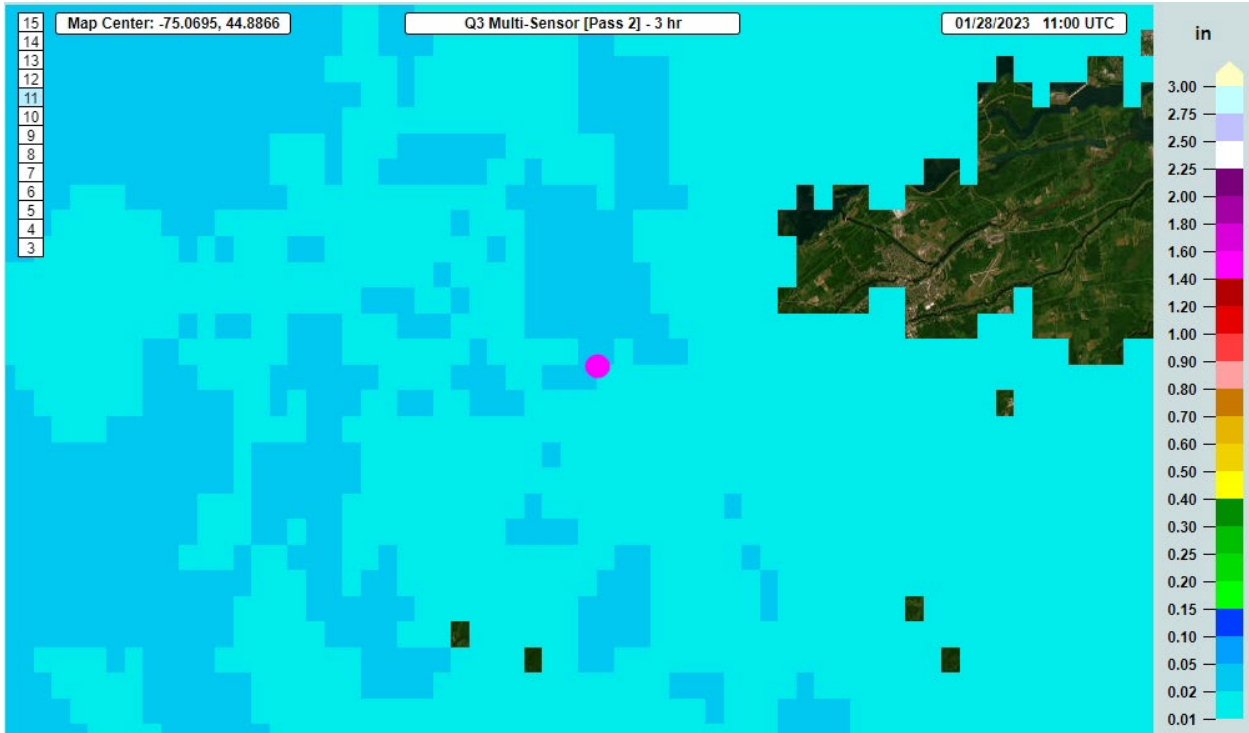


Figure 5 - MRMS Q3 Multi-Sensor 3-hour liquid equivalent precipitation accumulation (Pass 2) imagery valid at 0600. Crash location is depicted by the purple dot.

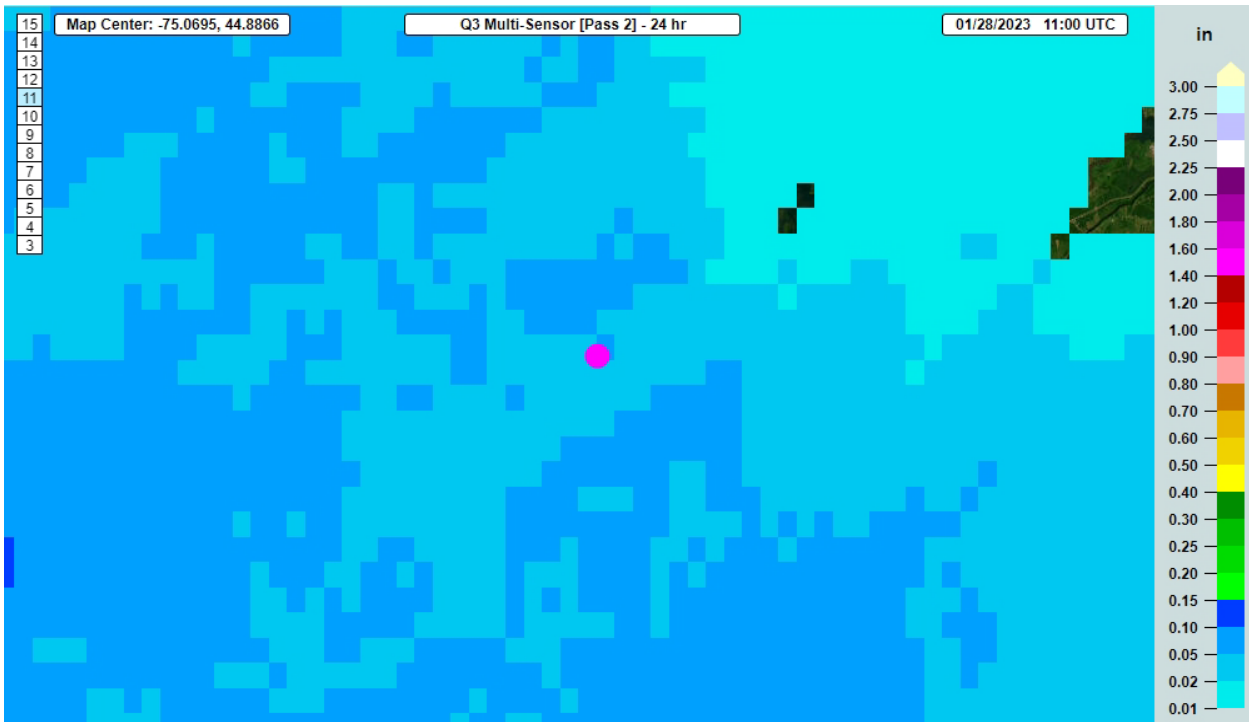


Figure 6 - MRMS Q3 Multi-Sensor 24-hour liquid equivalent precipitation accumulation (Pass 2) imagery valid at 0600. Crash location is depicted by the purple dot.

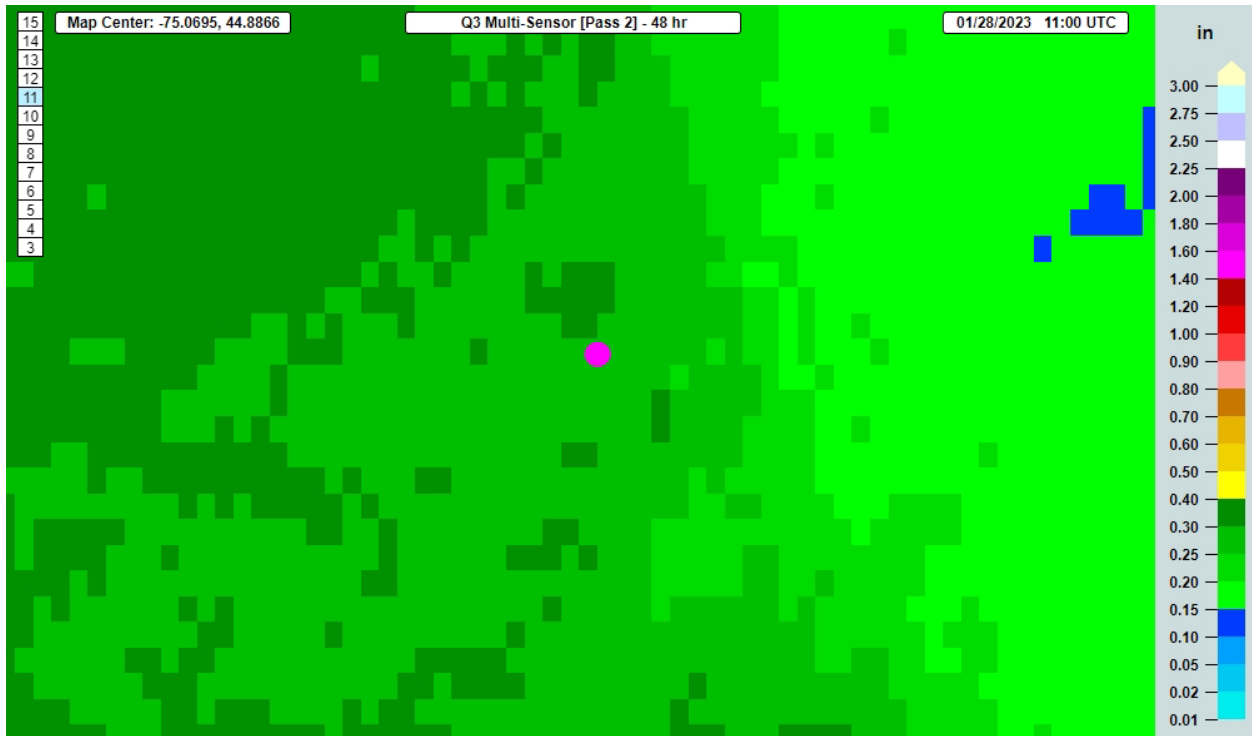


Figure 7 - MRMS Q3 Multi-Sensor 48-hour liquid equivalent precipitation accumulation (Pass 2) imagery valid at 0600. Crash location is depicted by the purple dot.

4.0 Zone Forecast Products

The National Weather Service Weather Forecast Office in Burlington, Vermont, issued the following Zone Forecast Products at 0258 and 0542 for an area that included the crash location. Only the "Today" section of those Zone Forecast Products are presented here.

*FPUS51 KBTV 280802
ZFPBTV
Zone Forecast Product for Vermont
National Weather Service Burlington VT
258 AM EST Sat Jan 28 2023*

*NYZ026-281500-
Northern St. Lawrence-
Including the cities of Massena and Norfolk
258 AM EST Sat Jan 28 2023*

.TODAY...Mostly cloudy. Scattered snow showers this morning, then isolated rain or snow showers this afternoon. Snow accumulation around an inch

possible. Highs in the mid 30s. Southwest winds 15 to 20 mph with gusts up to 35 mph. Chance of precipitation 50 percent.

FPUS51 KBTW 281046

ZFPBTV

Zone Forecast Product for Vermont

National Weather Service Burlington VT

542 AM EST Sat Jan 28 2023

NYZ026-281800-

Northern St. Lawrence-

Including the cities of Massena and Norfolk

542 AM EST Sat Jan 28 2023

.TODAY...Mostly cloudy. Numerous snow showers this morning, then scattered snow showers or isolated rain showers this afternoon. Snow accumulation around an inch. Highs in the mid 30s. Southwest winds 15 to 20 mph with gusts up to 35 mph. Chance of precipitation 70 percent.

E. LIST OF ATTACHMENTS

Attachment 1 - Five-minute reports from the MSS ASOS from 1900 on 25 January 2023 through the crash time.

Submitted by:

Mike Richards
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