



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

November 30, 2020

Specialist's Factual Report

METEOROLOGY

WPR20LA295

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A. ACCIDENT

Location: Three Rivers, California
Date: September 4, 2020
Time: about 1148 Pacific daylight time (PDT)
1848 coordinated universal time (UTC)
Airplane: Beechcraft BE35; Registration: N818S

B. SENIOR METEOROLOGIST

Don Eick
Senior Meteorologist
Operational Factors Division (AS-30)
National Transportation Safety Board

C. SUMMARY

On September 4, 2020, about 1148 Pacific daylight time, a Beechcraft 35 airplane, N818S was destroyed when it was involved in an accident near Three Rivers, California. The pilot and the passenger sustained fatal injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

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 PDT based upon the 24 hour clock, local time is +7 hours to UTC, and UTC=Z. 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 36.401944° N and longitude 118.613333° W, at an elevation of approximately 10,050 ft in the Sequoia National Park.

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 2.

1.1 Surface Analysis Chart

The western section of the NWS Surface Analysis Chart for 1100 PDT is included as figure 1 with topography and the approximate accident site marked by the red star. The chart depicted a thermal low-pressure system¹ at 1014-hectopascals (hPa)² in the immediate vicinity west of the accident site with a trough of low pressure running north-to-south along the eastern edge of the Sacramento Valley and the Sierra Nevada Mountain Range. A high pressure system was located to the north over western Nevada at 1021-hPa.

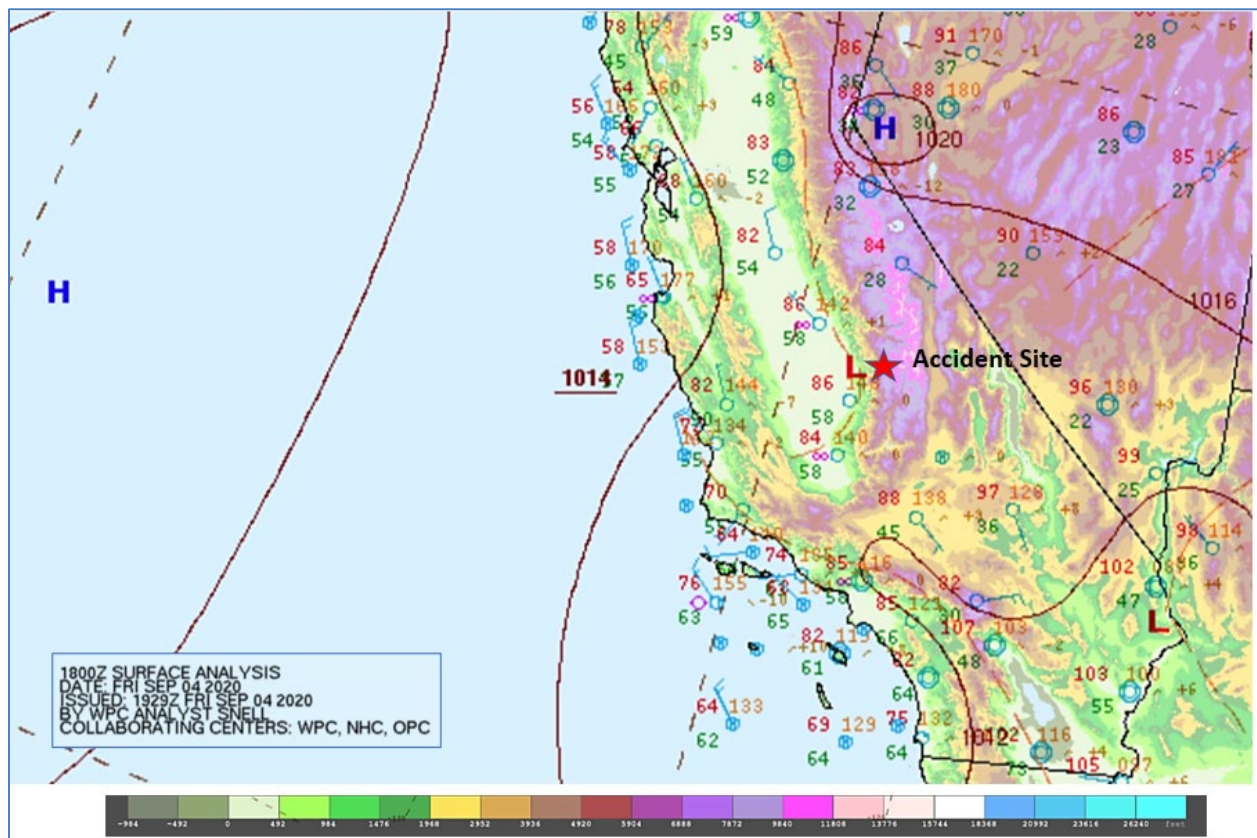


Figure 1 - Western section of the NWS Surface Analysis Chart for 1100 PDT with the accident site marked by the red star

The closest station models surrounding the accident site depicted a cyclonic or counterclockwise circulation around the low with wind speeds under 10 knots, with clear skies, temperatures near 86° F, and dew point temperatures near 58° F. Several of the stations reported visibility restricted in haze.

¹ A thermal low, or heat low, are non-frontal low-pressure areas that occur over the continents generally in the subtropics during the warm season, as a result of intense heating when compared to their surrounding environments.

² Hectopascals (hPa) is the new standard 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).

1.2 National Composite radar Mosaic

A review of the NWS National Composite radar Mosaic for the period surrounding the hour of the accident depicted an area of echoes immediately south of the accident site and very light intensity echoes immediately north. A review of the echoes indicated the area rapidly developed in the hour preceding the accident and expanded westward. The closest weather surveillance radar will be examined and documented in section 5.0 of this report.

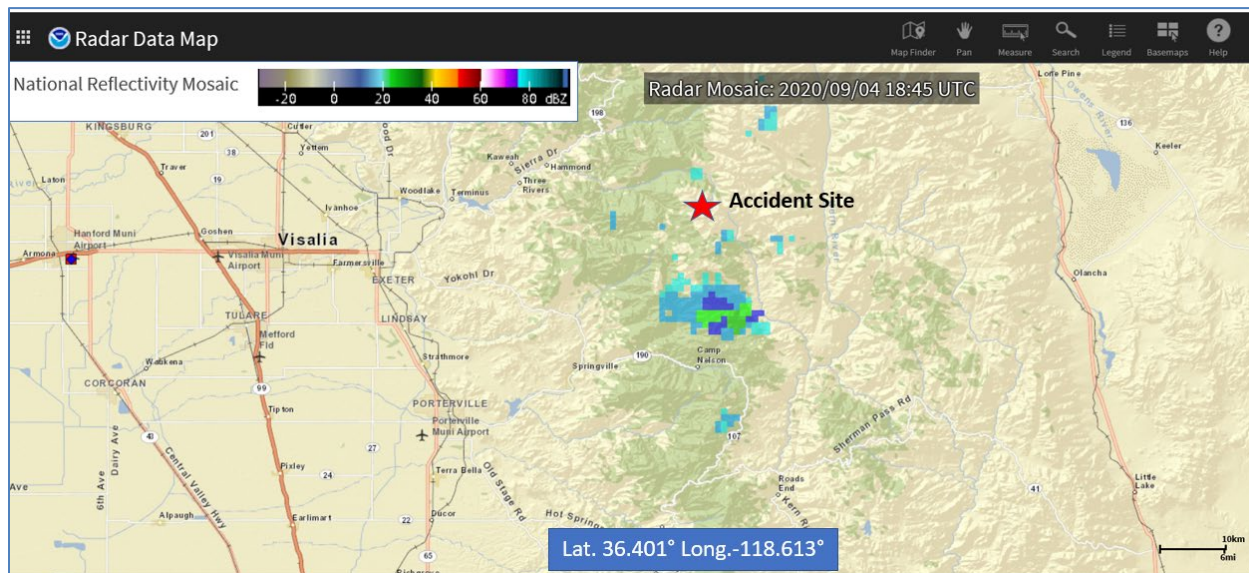


Figure 2 - Regional view of National Composite Radar Mosaic for 1145 PDT

2.0 Observations

The closest official NWS Meteorological Aerodrome Reports (METARs) and Specials (SPECI) were documented over the region. Cloud heights in the following section are reported in feet above ground level (agl), and the magnetic variation over the area was estimated at 12.5° E based on the local sectional chart.

2.1 Porterville, California

The closest weather station to the accident site was from Porterville Municipal Airport (KPTV), Porterville, California, located about 31 miles southwest of the accident site at an elevation of 443 ft. The airport had an Automated Weather Observation System (AWOS)³ which were not supplemented by an observer. At the approximate time of the accident the following conditions were being reported.

KPTV weather observation at 1145 PDT, automated, wind from 260° at 5 knots, visibility 8 miles, sky conditions clear below 12,000 ft agl, temperature 32° C (90° F), dewpoint 13° C (55° F), altimeter 29.96 inches of mercury ("Hg).

³ Automated Weather Observation System are operated, maintained, and controlled by state or local governments and other non-federal entities and are certified under the FAA non-federal AWOS Program.

The hourly observations issued surrounding the period and the general flight categories⁴ between 0800 through 1400 PDT were as follows.

VFR METAR KPTV 041456Z AUTO 19004KT 8SM CLR 22/13 A2998 RMK AO2 SLP148 T02170133 53012

VFR METAR KPTV 041556Z AUTO 19004KT 6SM HZ CLR 24/16 A2998 RMK AO2 SLP150 T02440156

VFR METAR KPTV 041656Z AUTO 21005KT 6SM HZ CLR 28/16 A2999 RMK AO2 SLP150 T02780161

VFR METAR KPTV 041755Z AUTO 21006KT 8SM CLR 30/14 A2998 RMK AO2

VFR METAR KPVT 041845Z AUTO, 26005KT 8SM CLR 32/13 A2996 RMK AO2

Accident 1848Z

VFR METAR KPTV 041856Z AUTO 28005KT 9SM CLR 32/13 A2996 RMK AO2 SLP142 T03170133

VFR METAR KPTV 041956Z AUTO 28009KT 10SM CLR 33/12 A2994 RMK AO2 SLP134 T03280117

VFR METAR KPTV 042056Z AUTO 21005KT 10SM CLR 34/12 A2992 RMK AO2 SLP128 T03440122 56018

2.2 Visalia, California

The next closest official weather station was from the departure site of Visalia Municipal Airport (KVIS), Visalia, California, located approximately 38 miles west of the accident site at an elevation of 294 ft. The airport had an AWOS whose reports were not augmented by any human observers. The sky conditions were also missing from these observations. The accident airplane departed the airport at approximately 1125 PDT and flew eastward towards the rising terrain. The conditions reported prior to departure and the accident were as follows.

KVIS weather observation at 1056 PDT, automated, wind from 200° at 4 knots, visibility 4 miles in haze, temperature 28° C (82° F), dewpoint 18° C (64° F), altimeter 29.97 "Hg. Remarks: automated station with a precipitation discriminator, sea level pressure 1015.1-hPa, temperature 27.8° C, dew point temperature 17.8° C, 6-hr maximum temperature 27.8° C, 6-hr minimum temperature 18.3° C, 3-hour pressure tendency risen 0.2-hPa, maintenance indicator on.

⁴ As defined by the NWS and the FAA Aeronautical Information Manual (AIM) section 7-1-7 defines the following general flight categories based on weather conditions reported:

- Low Instrument Flight Rules (LIFR*) – ceiling below 500 ft above ground level (agl) and/or visibility less than 1 statute mile.
- Instrument Flight Rules (IFR) – ceiling between 500 to below 1,000 feet agl and/or visibility 1 to less than 3 miles.
- Marginal Visual Flight Rules (MVFR**) – ceiling from 1,000 to 3,000 ft agl and/or visibility 3 to 5 miles.
- Visual Flight Rules (VFR) – ceiling greater 3,000 ft agl and visibility greater than 5 miles.

* By definition, IFR is a ceiling less than 1,000 ft agl and/or visibility less than 3 miles while LIFR is a sub-category of IFR.

**By definition, VFR is a ceiling greater than or equal to 3,000 ft agl and visibility greater than 5 miles while MVFR is a sub-category of VFR.

KVIS weather observation at 1156 PDT, automated, wind variable at 4 knots, visibility 6 miles in haze, temperature 29° C (84° F), dewpoint 17° C (63° F), altimeter 29.96 “Hg. Remarks: automated station with a precipitation discriminator, sea level pressure 1014.7-hPa, temperature 29.4° C, dew point temperature 17.2° C, maintenance indicator on.

At 1156 PDT the relative humidity was 48%, and the density altitude was approximately 2,040 ft. The general flight categories and raw observations surrounding the period were as follows:

VFR METAR KVIS 041156Z AUTO 31003KT 8SM 21/17 A2993 RMK AO2 SLP139 T02060167 10239 20206 55001 \$=

VFR METAR KVIS 041256Z AUTO 00000KT 8SM 21/16 A2994 RMK AO2 SLP141 T02060161 \$=

VFR METAR KVIS 041356Z AUTO 20003KT 6SM BR 18/17 A2995 RMK AO2 SLP147 T01830167 \$=

VFR METAR KVIS 041456Z AUTO 00000KT 6SM HZ 21/17 A2996 RMK AO2 SLP150 T02060172 53010 \$=

MVFR METAR KVIS 041556Z AUTO 18003KT 5SM HZ 22/18 A2997 RMK AO2 SLP153 T02220178 \$=

MVFR METAR KVIS 041656Z AUTO 00000KT 5SM HZ 25/18 A2997 RMK AO2 SLP153 T02500183 \$=

MVFR METAR KVIS 041756Z AUTO 20004KT 4SM HZ 28/18 A2997 RMK AO2 SLP151 T02780178 10278 20183 50002 \$=

Departure 1825Z/Accident 1848Z

VFR METAR KVIS 041856Z AUTO VRB04KT 6SM HZ 29/17 A2996 RMK AO2 SLP147 T02940172 \$=

VFR METAR KVIS 041956Z AUTO 22003KT 6SM HZ 32/17 A2993 RMK AO2 SLP137 T03170172 \$=

VFR METAR KVIS 042056Z AUTO VRB05KT 10SM 33/16 A2991 RMK AO2 SLP131 T03330156 58019 \$=

2.3 METAR Depiction

The NWS Aviation Weather Center’s METAR display for 1130 PDT is included as figure 3 with the approximate accident site marked by the red star. The image depicted general light winds and VFR conditions prevailing over the area with multiple stations reporting visibility restricted in smoke and haze.

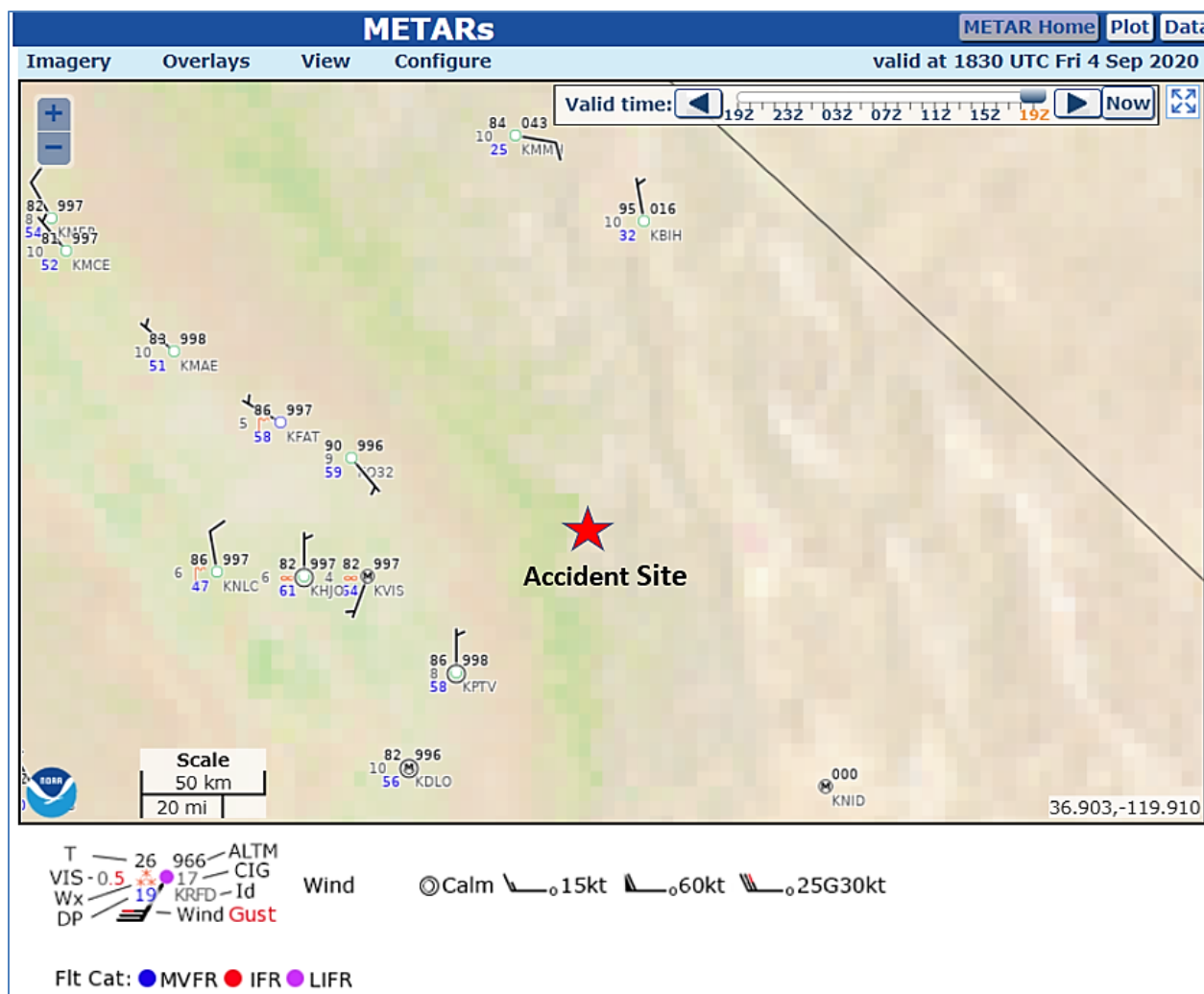


Figure 3 - NWS Aviation Weather Center's METAR display at 1130 PDT with the accident sit marked

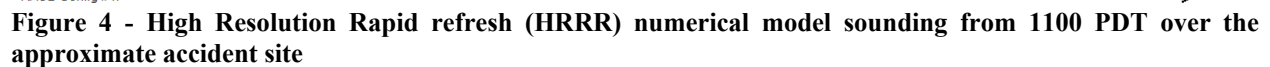
3.0 Model Sounding

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 Resources Laboratory and plotted on a standard Skew T log P diagram⁶ using the complete Rawinsonde Observation RAOB program software⁷. Figure 4 is the HRRR numerical model sounding for 1100 PDT over the accident site coordinates plotted from the surface to 440-hPa or approximately 24,000 ft.

⁵ The HRRR is a National Oceanic and Atmospheric Administration (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.

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 – (The complete Rawinsonde Observation program) is an interactive sounding analysis program developed by Environmental Research Services, Matamoras, Pennsylvania.



The HRRR wind profile indicated a surface wind from the south-southeast or from 160° at 14 knots with the wind backing to the east with height with wind speeds of 15 knots or less. The RAOB program did not depict any strong vertical shears or turbulence layers.

The Geostationary Operational Environmental Satellite number 17 (GOES-17) data were obtained from an archive at the Space Science Engineering Center (SSEC) at the University of Wisconsin-Madison in Madison, Wisconsin, and processed using the Man-computer Interactive Data Access System (McIDAS) software. The infrared long wave (band 13) imagery at a

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wavelength of 10.3 microns (μm) and a resolution of 2 km, and the visible (band 2) at a wavelength of 0.64 μm and a resolution of 0.5 km were obtained surrounding the time of the accident.

The GOES-17 visible satellite image for 1146 PDT at 2X magnification is included as figure 5 and depicted clear skies over California during the period with a forecast fire noted approximately 10 miles southeast of the accident site with a smoke plume extending to the west-northwest and extending over the flight path.

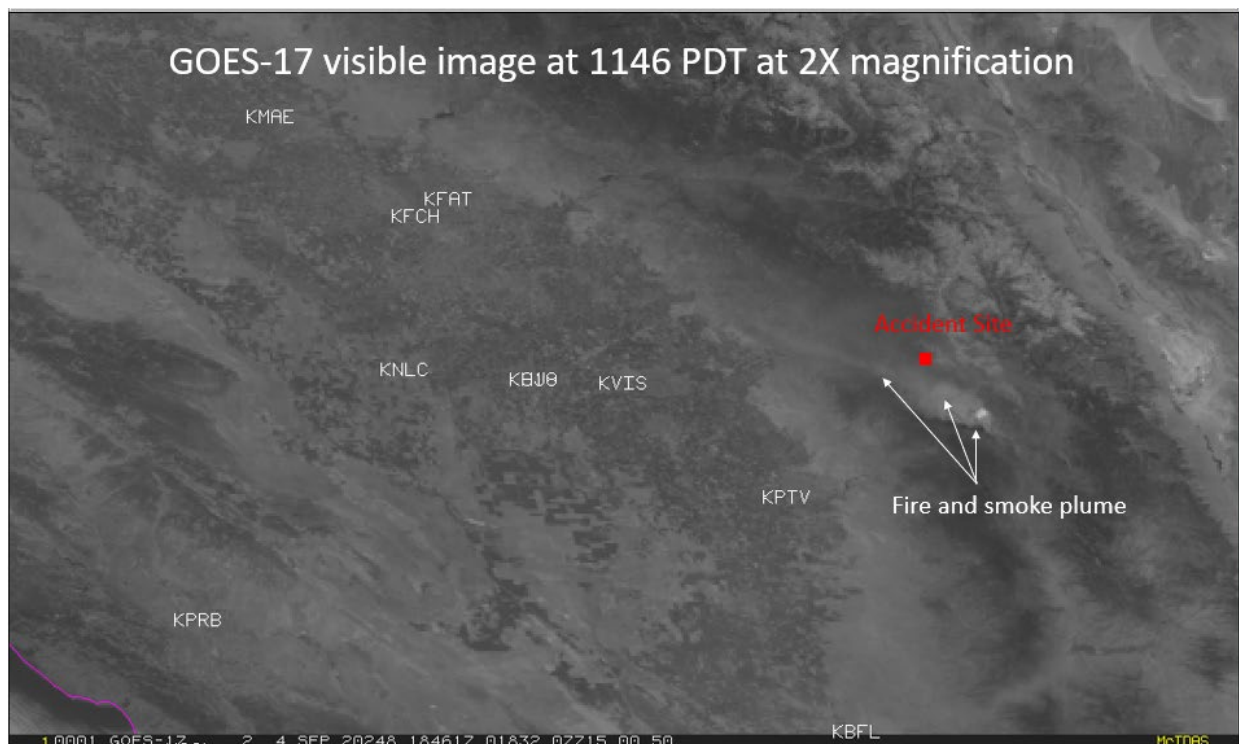


Figure 5 - GOES-17 visible image at 1146 PDT at 2X magnification with the accident site

The GOES-17 southwest sector of the high resolution GeoColor⁹ or true color daytime imagery from the Cooperative Institute for Research in the Atmosphere (CIRA) were obtained immediately after the accident, which helps identify smoke, blowing dust, and anything that has a unique color property. Figures 6 through 9 are the GeoColor images at 1116, 1156, 1231, and 1306 PDT which shows the spread of the smoke cloud in the vicinity of the accident site surrounding the period. The images identify a significant fire and smoke plume developing during the period and moving northwestward into the Sacramento Valley and over the flight route and accident site.

⁹ The GeoColor is a multispectral product composed of True Color (using a simulated green component) using bands 1, 2, and 3 (0.47 blue, 0.64 red, and 0.86 μm – near IR during the daytime, and an infrared product that uses bands 7 and 13 at night. During the daytime, the imagery looks approximately as it would appear when viewed with human eyes from space. GeoColor was developed at CIRA and STAR's Regional and Mesoscale Meteorology Branch (RAMMB).

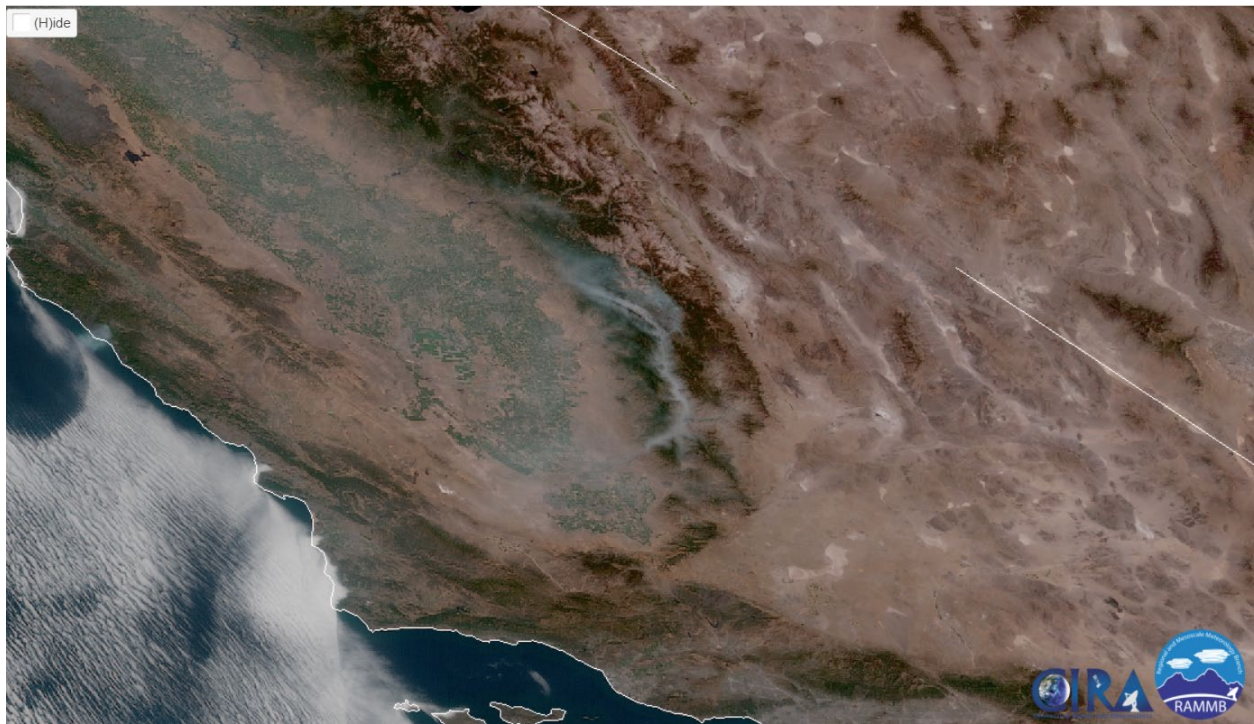


Figure 6 - GOES-17 GeoColor image at 1116 PDT near time of departure

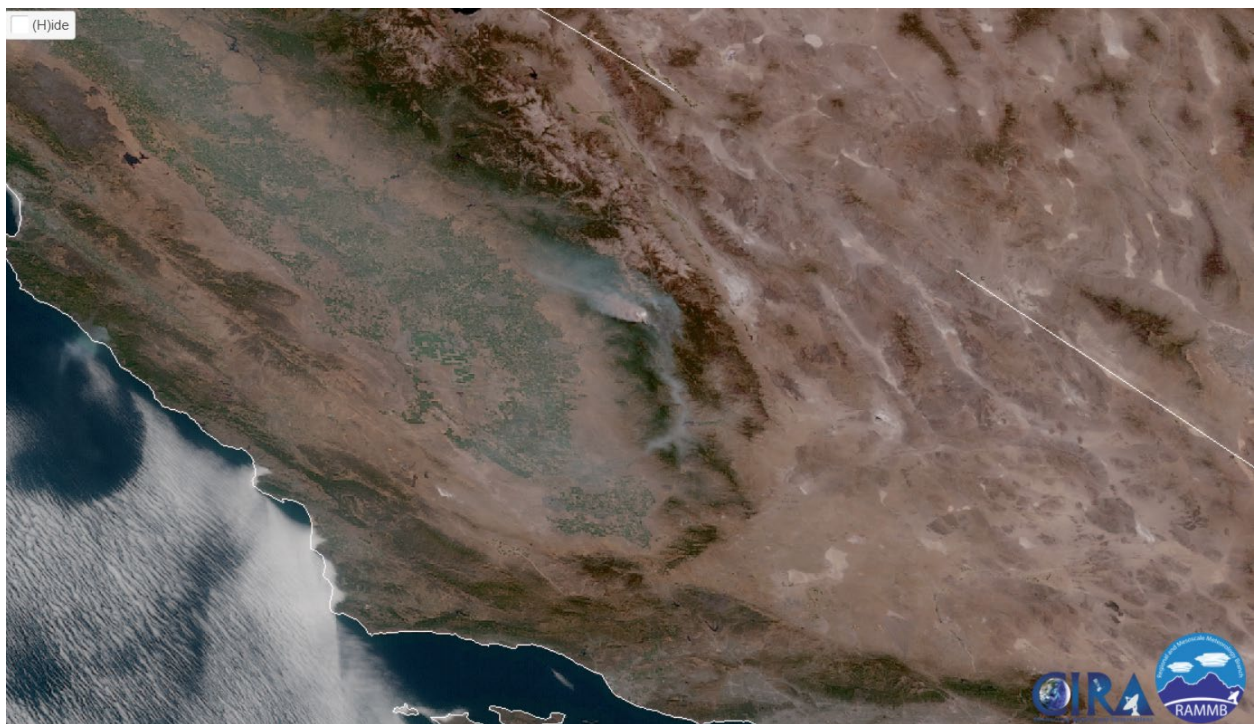


Figure 7 - GOES-17 GeoColor image at 1156 PDT immediately after the accident

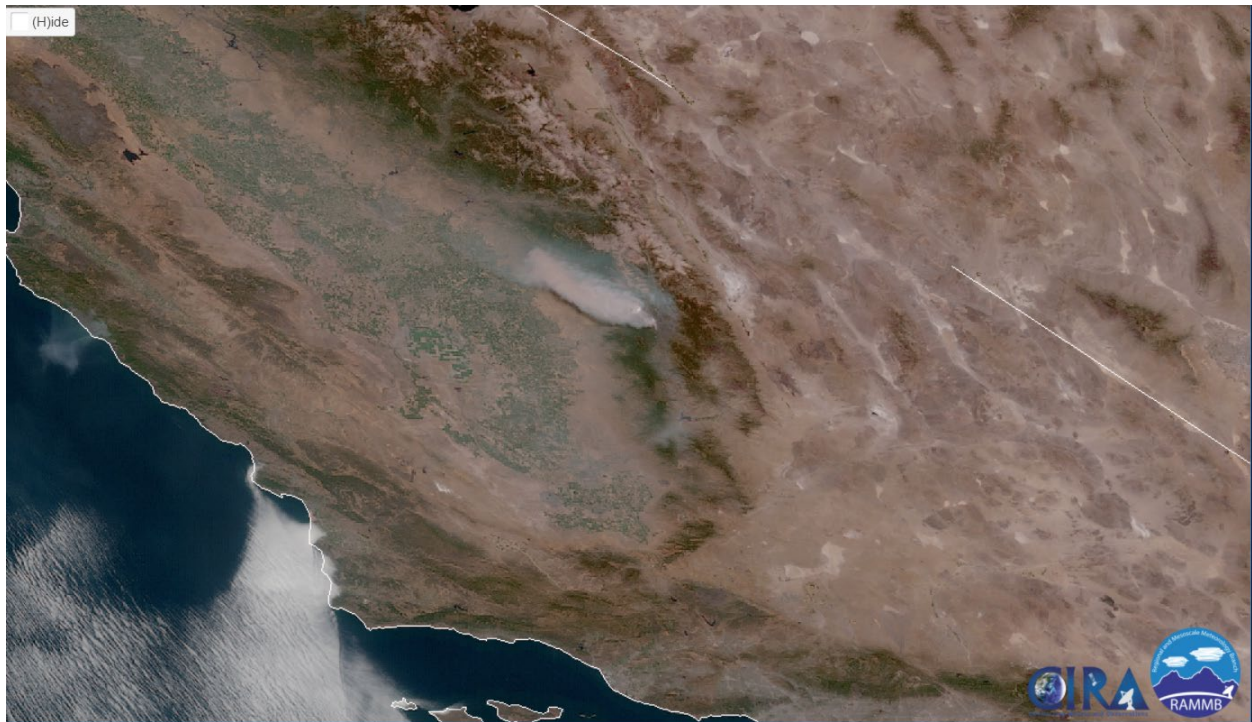


Figure 8 - GOES-17 GeoColor image at 1231 PDT after the accident

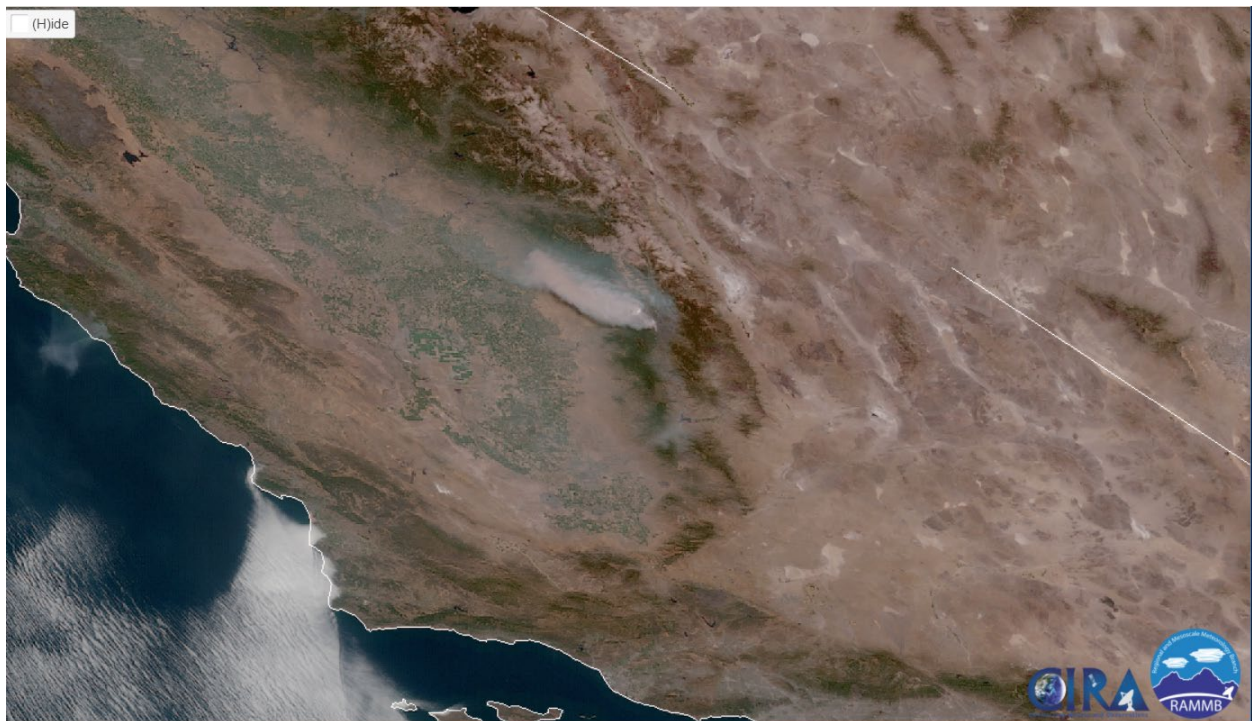


Figure 9 - GOES-17 GeoColor image for 1306 PDT

5.0 Weather Surveillance Radar Imagery

The closest Weather Surveillance Radar-1988 Doppler (WSR-88D)¹⁰ to the accident site was from Edwards Air Force Base, with the radar antenna located in Boren, California (KEYX) which was located approximately 93 miles south-southeast of the accident site. During the period surrounding the time of the accident the computer-controlled radar was operating in the clear air mode, volume coverage pattern 35 (VCP-35), where the radar makes 8 overlapping elevation scans every 7-minutes.

Figure 10 is the KEYX WSR-88D 0.48° base reflectivity image at 1148 PDT which depicted an area of echoes associated with the smoke plume from the Sequoia Fire complex to the south-southwest of the accident site. The KEYX 0.48° base reflectivity image was scanning the altitudes from 8,650 ft to 18,020 ft¹¹. The flight track is depicted 4 miles north of an area of echoes with reflectivities of 28 dBZ at that elevation scan associated with a smoke plume. The echoes increased to 32.5 dBZ at the 0.83° elevation scan, with the highest echo tops of 15 dBZ to 22,300 ft. A review of the correlation coefficient dual polarization product indicated the echoes were non-meteorological or not associated with liquid or ice crystals.

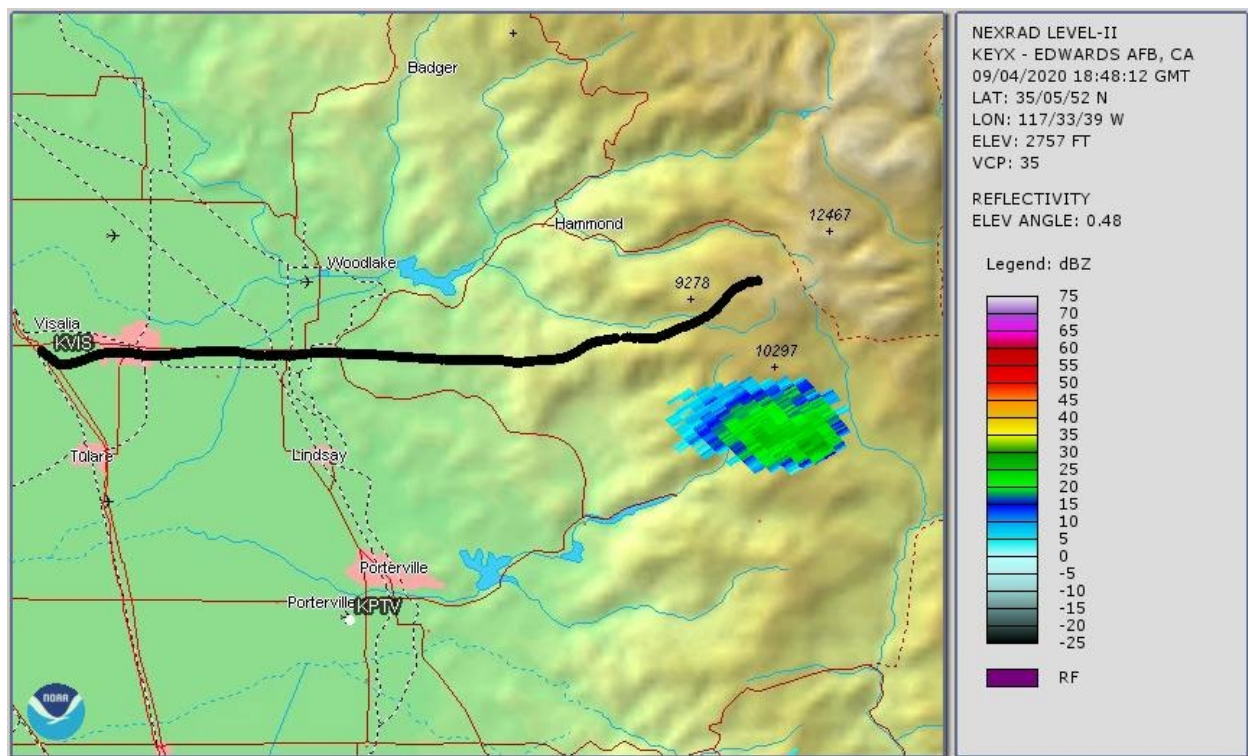


Figure 10 - KEYX WSR-88D 0.48° base reflectivity image at 1148 PDT with flight track

¹⁰ The WSR-88D is a S-band 10-centimeter wavelength radar with a power output of 750,000 watts, with a 28-foot parabolic antenna concentrating the energy into a 0.95° beam width. The radar produces three basic types of products reflectivity, radial velocity, and spectral width.

¹¹ Based on the KEYX antenna height of 2,872 ft and a distance of 93 nm from the antenna.

6.0 Pilot Reports

The following pilot reports (PIREPs) were recorded within 100 miles of the accident site from 0830 through 1400 PDT. The original raw PIREPs in standard code and abbreviations with time referenced to UTC are included below followed by a plain language decoded version with time reference to PDT. The reports were as follows:

FAT UA /OV FRA160025/TM 1506/FL090/TP C182/RM HZ OVER SELMA ZOA CWSU

Fresno Yosemite International Airport (FAT), Fresno, California, routine pilot report (UA); Over – 160° azimuth and 25 miles from the Friant VORTAC¹² (or approximately 60 miles west-northwest of the accident site), Time – 0806 PDT; Altitude – 9,000 ft; Type aircraft – Cessna Skylane; Remarks – haze over Selma from the Oakland Air Route Traffic Control Center (ARTCC).

NLC UUA /OV NLC/TM 1800/FL7500/TP C206/SK FU CLR/WX 6SM CLR/TA 30/WV 34013/RM PILOT REPORT 1/4/ PIECES OF ASH 14 MILES WEST OF NLC.

Lemoore Naval Air Station (NLC), Lemoore, California, routine pilot report; Over – NLC (or approximately 65 miles west of the accident site); Time – 1100 PDT; Altitude – 7,500 ft; Type aircraft – Cessna Stationair; Sky conditions – smoke with clear skies; Weather – flight visibility 6 miles; Temperature – +30° C; Wind – from 340° at 13 knots; Remarks – pilot encountering 1/4" pieces of ash 14 miles west of NCL.

7.0 NWS Forecasts and Advisories

The standard NWS forecasts and advisories over the area were as follows.

7.1 Terminal Aerodrome Forecast

The NWS San Joaquin Valley (KHNX) Weather Forecast Office (WFO), located in Hanford, California was responsible for the issuance of the Terminal Aerodrome Forecast (TAF) for the departure airport KVIS and issued during the period were as follows.

*TAF KVIS 041124Z 0412/0512 00000KT P6SM SKC
FM041600 VRB05KT 4SM FU HZ SKC=*

The TAF issued for KVIS at 0524 PDT expected from 0900 PDT MVFR conditions to prevail with a light and variable wind at 5 knots, visibility 4 miles in smoke and haze, sky clear below 12,000 ft agl. The next schedule TAF was issued at 1020 PDT and changed the visibility to 5 miles in smoke and haze.

TAF KVIS 041720Z 0418/0518 VRB05KT 5SM FU HZ SKC

The forecast for the planned destination of Needles Airport (KEED) issued at 1020 PDT was as follows:

¹² A VORTAC is a radio-based navigational aid for aircraft pilots consisting of a co-located VHF omnidirectional range (VOR) beacon and a tactical air navigation system (TACAN) beacon for distance information. Unless otherwise noted the name of the VORTAC corresponds to the city it is located.

TAF KEED 041720Z 0418/0518 VRB05KT P6SM SKC

FM042000 18007KT P6SM SKC

FM050300 24008KT P6SM SKC

FM051700 VRB05KT P6SM SKC

The forecast for KEED expected VFR conditions to prevail with light and variable winds of 5 knots, visibility 6 miles or more, with skies clear below 12,000 ft.

7.2 Area Forecast Discussion

The NWS Area Forecast Discussions (AFD) are issued by each WFO to describe the short term weather conditions within their region with an aviation section that includes the general conditions as they relate to the creation of the TAF. These are useful for identifying 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 corresponds to the release of the latest TAFs for that office. The NWS KHNX WFO issued the following AFD at 0348 PDT regarding the forecast period, the aviation discussion is included in bold print below.

FXUS66 KHNX 041058

AFDHXX

Area Forecast Discussion

National Weather Service Hanford CA

358 AM PDT Fri Sep 4 2020

.SYNOPSIS...Dangerous temperatures will impact the central California interior for the upcoming Labor Day Holiday. Some locations will be close or slightly above records, especially on Sunday and Labor Day. Temperatures will slowly decrease by Tuesday through next Thursday, but will remain above average. Smoke from surrounding wildfire will continue to plague the area for at least through Wednesday.

.DISCUSSION...For today, high pressure will continue to slowly strengthen over the four-corners. Afternoon high temperatures will slightly increase for the West Side Hills and the Kern county desert. An Excessive Heat Warning will begin this afternoon for the Kern desert, where afternoon high temperatures will reach between 105 to 115 degrees with poor overnight recoveries. However, I have lower confidence for increasing temperatures in both the valley and foothills. This is because smoke from the SQF Complex wildfire will be more dense in these regions, which will counteract any synoptic warming. This will especially be the case from Tulare county northward to Merced county. As such, I have lowered the NBM temperatures a few degrees for these areas.

From Saturday through Sunday, the aforementioned high pressure over the four-corners will strengthen to an impressive, and very anomalous 600 decameters. This high pressure will then start to slightly weaken on Labor Day as a deep trough begins to swing southward into the northern Great Basin. Temperatures through Labor Day will ramp up for all locations across the central California interior. An Excessive Heat Warning will take effect Saturday afternoon for the West Side Hills, Southern San Joaquin Valley, Southern Sierra Foothills, and portions of the Kern County mountains. The Excessive Heat Warning for all areas will remain in effect until Labor Day evening. Temperatures each day for these locations will range from 100 to 110 degrees. Low temperatures will range from 70 to 80 degrees, with urban areas and foothill locations seeing the poorest overnight recoveries.

On Tuesday the prior mention trough will swing south through the Great Basin. Synoptic cooling across the region will slowly lower temperatures each day, but will remain above normal for mid-September.

.AVIATION...

Areas of MVFR visibility due to haze and smoke can be expected in the San Joaquin Valley during the next 24 hours. Locally poor visibility due to wildfire smoke will linger mainly over the Tulare County mountains. VFR conditions will prevail elsewhere over the central California interior during the next 24 hours.

.AIR QUALITY ISSUES...

On Friday September 4 2020... Unhealthy in Kern County and Sequoia National Park and Forest. Unhealthy for sensitive groups in Fresno... Kings... Madera and Tulare Counties. Further information is available at Valleyair.org

An Air Quality Alert issued by local Air Pollution Control Districts is in effect for portions of the central California interior for smoke due to area wildfires until fires are extinguished. For details, please see SFOAQAHNX.

.CERTAINTY...

The level of certainty for days 1 and 2 is medium.

The level of certainty for days 3 through 7 is medium.

Certainty levels include low...medium...and high. Please visit www.weather.gov/hnx/certainty.html for additional information an/or to provide feedback.

.HNX WATCHES/WARNINGS/ADVISORIES...

Excessive Heat Warning from 1 PM this afternoon to 9 PM PDT Monday for CAZ198-199.

Excessive Heat Warning from 1 PM Saturday to 9 PM PDT Monday for CAZ179>191-196-197.

public/avn/fire wx...CMC

PIO/IDSS.....BS

7.3 Graphic Forecast for Aviation

The NWS Graphic Forecast for Aviation (GFA) product provides a graphical depiction of observed and forecasts of weather phenomena critical for aviation safety. The data includes surface wind, weather, with color coded general flight categories of visibility, and cloud cover, with the Graphic-Airmen's Meteorological Information (G-AIRMET) for IFR conditions, mountain obscuration, and icing conditions overlaid. The GFA is available at the NWS AWC website and through other weather briefing providers.

Figures 11 and 12 are the southwest section of the GFA Surface Forecast and Cloud Forecast valid for the period between 1100 and 1300 PDT. The Surface Forecast depicted light and variable winds with visibility better than 5 miles in smoke. The GFA Cloud Forecast indicated clear skies over the region with a G-AIRMET depicted over the accident site for mountain obscuration.

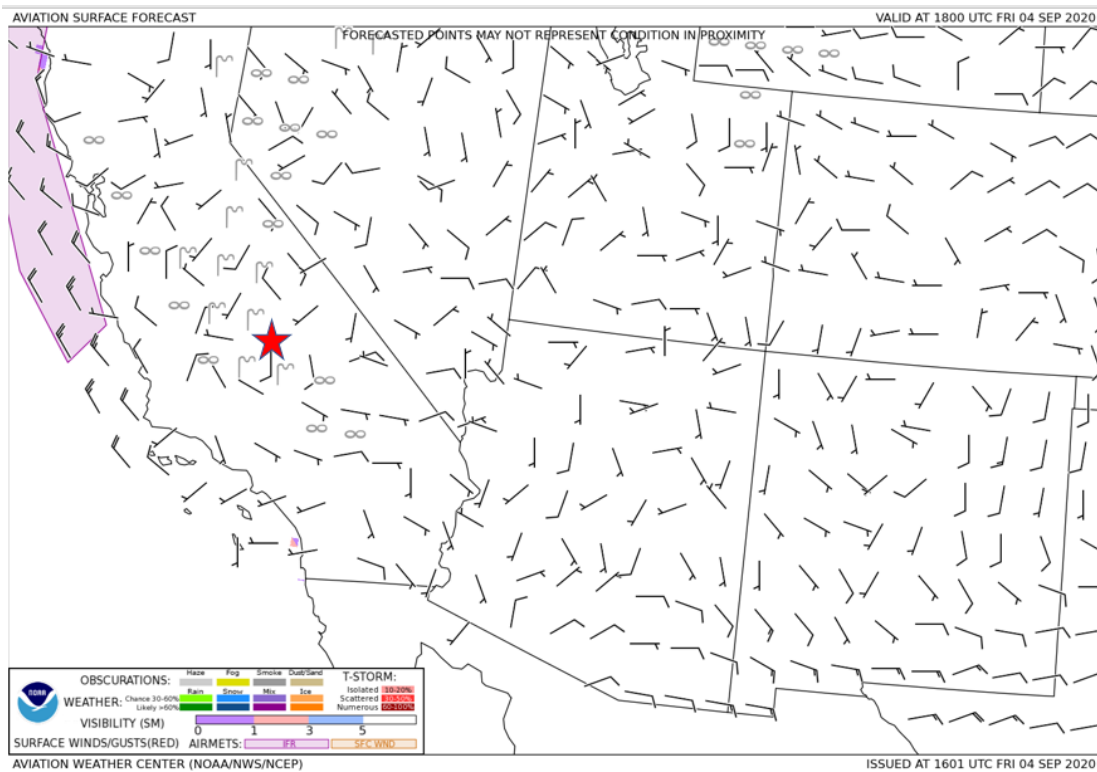


Figure 11 - GFA Surface Forecast valid for the period from 1100 through 1300 PDT

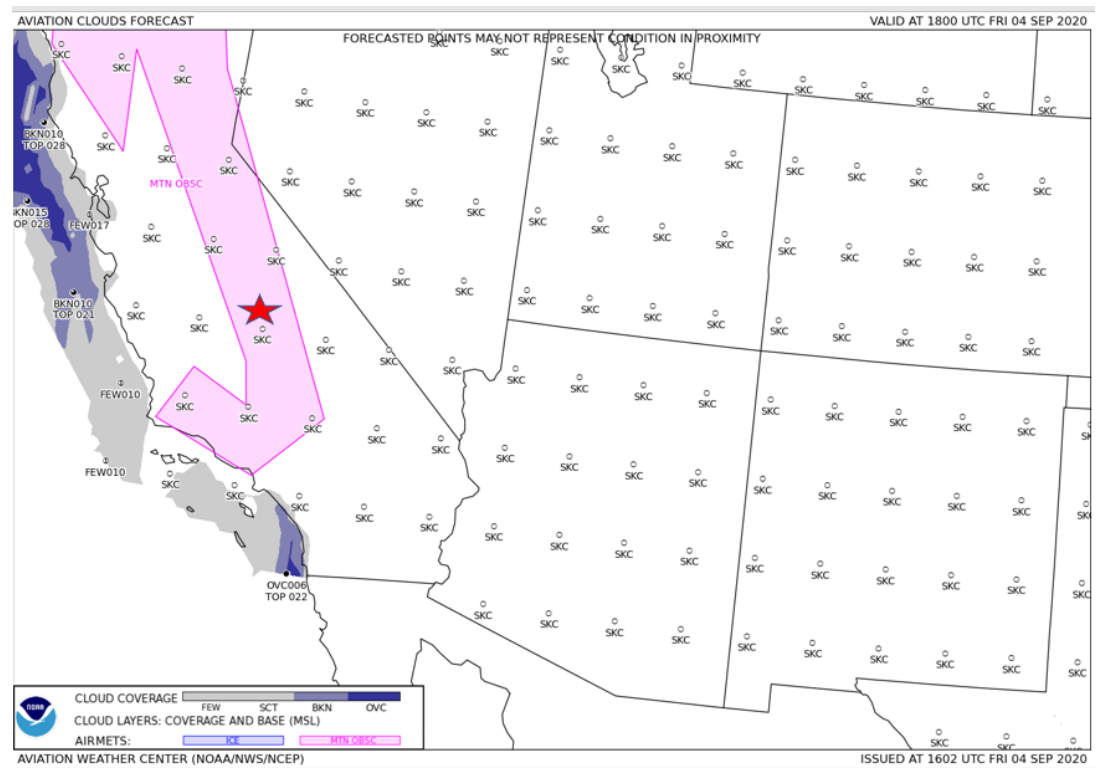


Figure 12 - GFA Cloud Forecast valid for the period from 1100 through 1300 PDT

7.4 Winds Aloft Forecast

The Winds and Temperature Aloft Forecast taken from the FBUS bulleting for the route of flight current during the period with was as follows.

WINDS ALOFT FORECASTS

DATA BASED ON 041800Z

VALID 050000Z FOR USE 2000-0300Z. 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>FAT</i>	<i>3210</i>	<i>9900+27</i>	<i>1810+20</i>	<i>1616+12</i>	<i>1213-05</i>	<i>1207-17</i>	<i>090733</i>	<i>111040</i>	<i>091250</i>
<i>BIH</i>		<i>9900</i>	<i>1709+21</i>	<i>1608+14</i>	<i>9900-05</i>	<i>1107-18</i>	<i>070933</i>	<i>070940</i>	<i>061250</i>
<i>WJF</i>		<i>2505+28</i>	<i>0605+20</i>	<i>0813+12</i>	<i>1219-04</i>	<i>1014-17</i>	<i>091533</i>	<i>101740</i>	<i>081751</i>
<i>ONT</i>	<i>2405</i>	<i>1607+27</i>	<i>1114+19</i>	<i>0915+12</i>	<i>1120-05</i>	<i>1115-17</i>	<i>091233</i>	<i>101740</i>	<i>081751</i>
<i>LAS</i>		<i>9900+30</i>	<i>0606+22</i>	<i>0406+14</i>	<i>1011-05</i>	<i>1705-18</i>	<i>071033</i>	<i>071541</i>	<i>051751</i>
<i>BLH</i>	<i>9900</i>	<i>9900+28</i>	<i>1405+19</i>	<i>1208+11</i>	<i>1020-03</i>	<i>1214-17</i>	<i>101133</i>	<i>091440</i>	<i>071452</i>

The accident site was located between Lancaster (WJF), Fresno (FAT), California, and Las Vegas (LAS), Nevada. The wind forecasts for 9,000 ft at WJF was from 060° at 5 knots with a temperature of 20° C, for FAT from 180° at 10 knots with a temperature of 20° C, and for LAS from 060° at 6 knots with a temperature of 22° C.

7.5 Inflight Weather Advisories

The NWS AWC had no Significant Meteorological Advisory's (SIGMET) or Convective SIGMETs current over the area for any for severe turbulence, icing, or thunderstorms. In addition, the Los Angeles Air Route Traffic Control Center (ZLA) Center Weather Service Unit issued no Center Weather Advisories or Meteorological Impact Statements over the area. The AWC had a G-AIRMET current for mountain obscuration over the area as depicted in figure 13 due to smoke and haze.

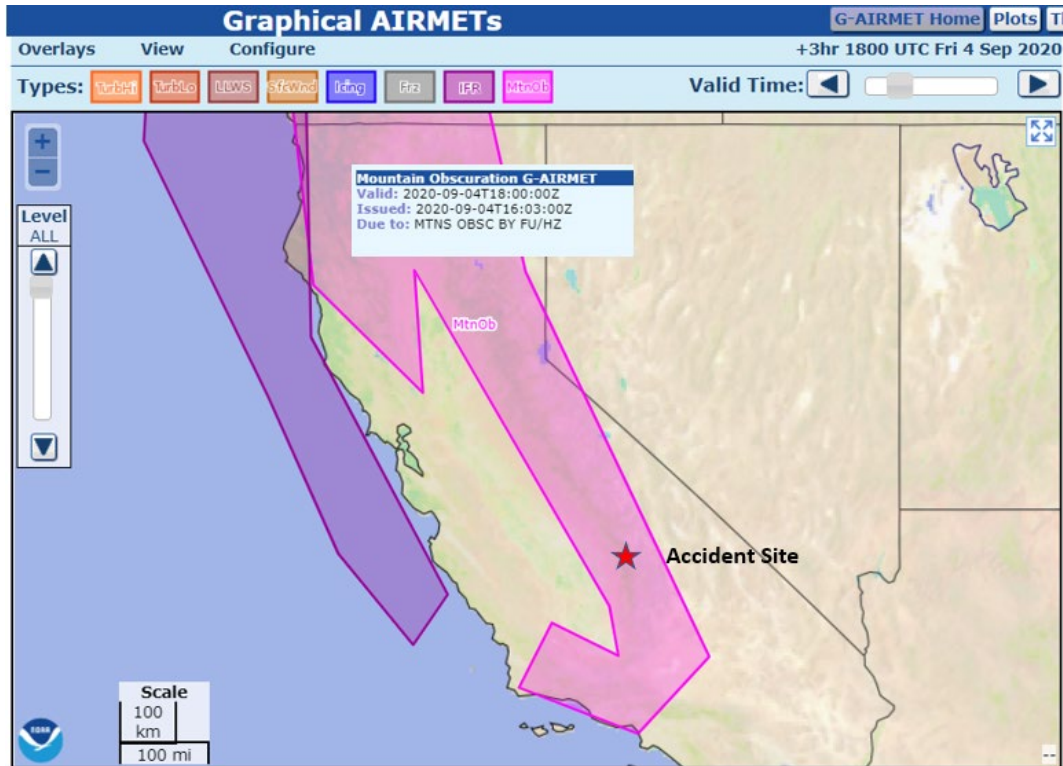


Figure 13 - NWS AWC G-AIRMET valid for the period for mountain obscuration conditions

8.0 California Fire Summary

The California Department of Forestry and Fire Protection “CAL FIRE” statewide fire summary for September 4, 2020 provided the status of the 27 different major wildfires in California occurring during the period.

The Fire Weather Forecast for the day indicated that an extreme heat wave was expected to continue through the weekend with widespread triple digits. The NWS has issued an Excessive Heat Warning from Saturday through Tuesday for much of California, and that a Red Flag Warning was in effect in Modoc County this afternoon through the evening for strong gusty winds and low humidity. A Fire Weather Watch was also in effect for Modoc County for strong gusty winds and low humidity. An above normal large fire potential was expected across much of California in September with central and northern California remaining above average into October. With the Labor Day weekend starting, CAL FIRE was urging all Californians to take extreme caution to prevent sparking a wildfire, as with the excessive heat warning, coupled with dry conditions, fire danger was elevated during the period.

Three areas of wildfires surrounded the accident site with the SQF Complex to the south, the Rattlesnake fire to the southeast, and the Moraine wildfire to the north. Figure 14 is a depiction of the wildfires with the accident site marked by the red star.

The SQF Complex, Tulare County – Status on September 4, 2020

The areas was designated 25 miles north of Kernville, in the Sequoia National Forest or approximately 18 miles south-southeast of the accident site. Indicated that the fire impacted 52,017 acres and was only 1% contained. The fire originated on August 19 from lightning. The advisory also indicated that the lightning-caused the Castle and Shotgun Fires had merged into this complex.

Rattlesnake, Tulare County Fire

Impacted the Sequoia and Kings Canyon National Parks Wilderness and indicated that 156 acres had burned and was 0% contained on September 4, 2020. The Rattlesnake Fire was discovered on August 16 after substantial lightning occurred over the area. It is located within the Sequoia and Kings Canyon Wilderness in the Kern River drainage. On September 4th the fire was burning in steep inaccessible terrain with sparse ground fuels and pockets of dead and down trees. While the size of the fire has increased, there are no current threats to life or property.

Moraine, Tulare County Fire

Impacted the Sequoia and King Canyon National Parks Wilderness areas and had burned 290 acres and was 40% contained. The Moraine Fire was discovered on August 21 after substantial lightning occurred over the area. There was no identified threat to life or property at the time, and due to the limited firefighting resources and the fire burning in designated wilderness areas, the fire was being monitored only.

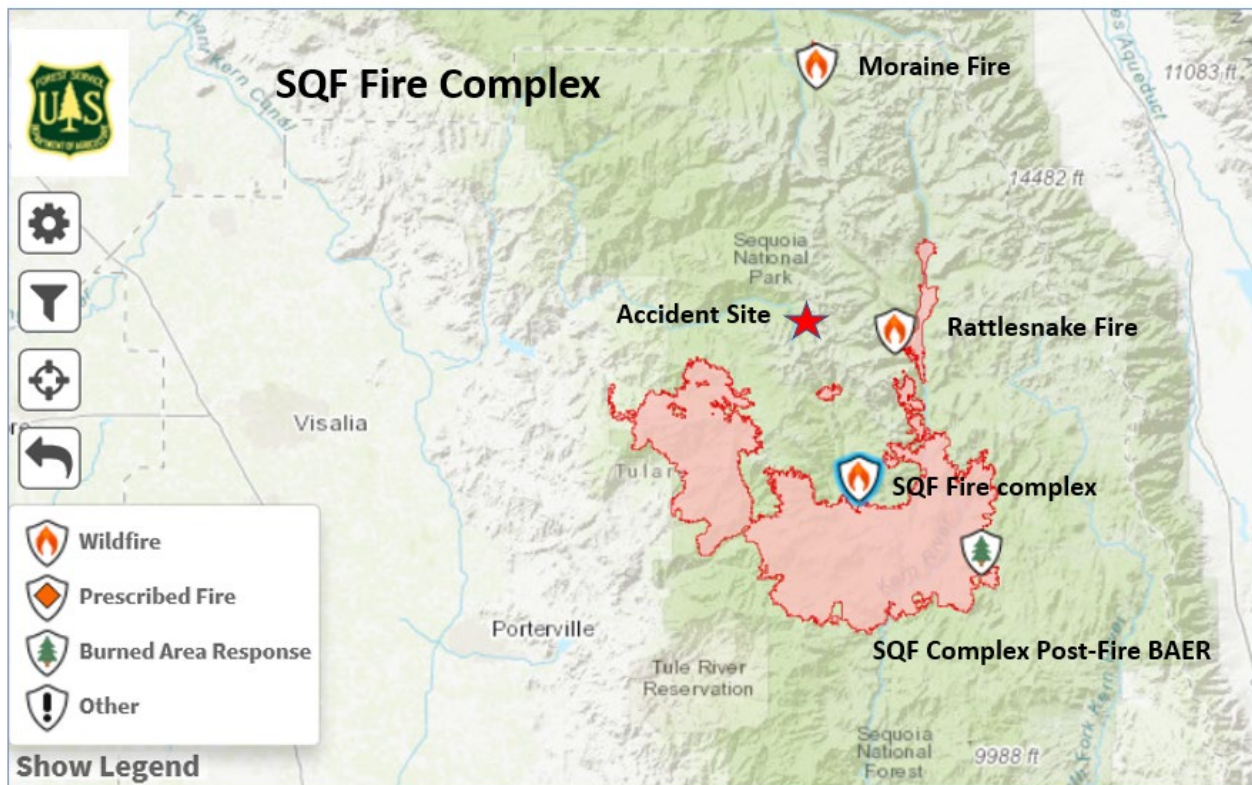


Figure 14 - CAL FIRE status map of the wildfires over the area on September 20, 2020

Figure 15 and 16 are photographs from the Tulare Fire Department, Tulare, California, which were taken from a located approximately 7 miles south of KVIS looking east towards the SQF Fire complex on September 4, 2020 at an unknown time. The images show an extensive smoke plume drifting northward up the Sacramento Valley. Figure 17 is the Rattlesnake fire looking northward on the same day, as smoke obscures the higher terrain.



Figure 15 - Photograph of Tulare Fire Station and the SQF Fire on September 4, 2020 looking east



Figure 16 - Photograph of the SQF Fire complex looking east from Tulare Fire Department



Figure 17 - Rattlesnake fire on September 4, 2020 looking northward

9.0 Experiment Smoke Model

The NOAA Global Systems Laboratory HRRR-Smoke¹³ experimental numerical model data were retrieved for the period. The HRRR-Smoke was initialized at 1100 PDT and produced smoke information which is included in figures 18 through 21 with the approximate accident site noted within the red circle. The imagery indicated between 60 to 200 $\mu\text{g}/\text{m}^3$ concentration of fine particulate matter (fire smoke) near the surface of the accident site through 6,000 ft agl.

¹³ <https://rapidrefresh.noaa.gov/hrrr/HRRRsmoke/>

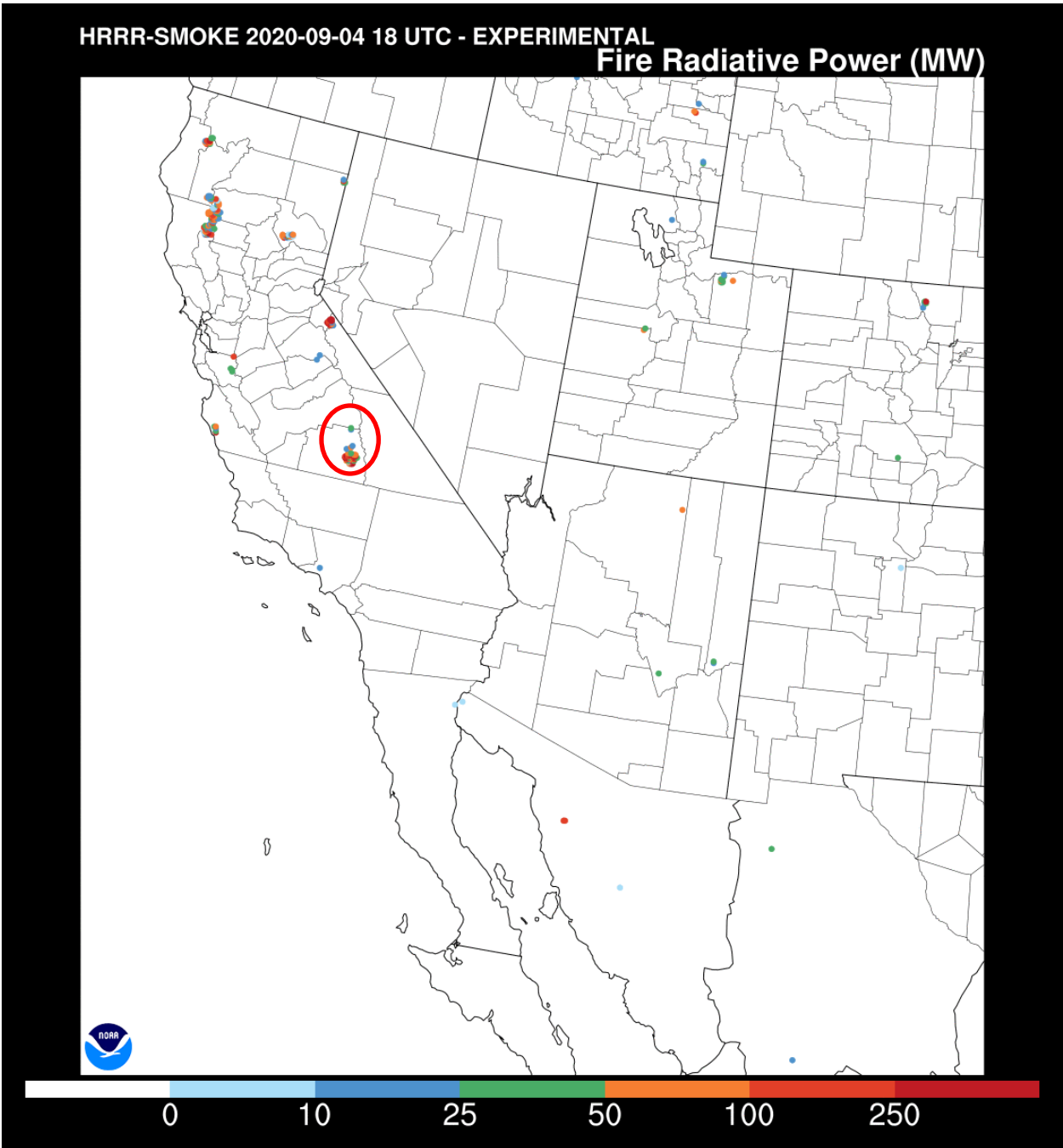


Figure 18 - HRRR-smoke model Fire Resolution Power for 1100 PDT

HRRR-SMOKE 2020-09-04 18 UTC 0h fcst - Experimental/valid 09/04/2020 18:00 UTC
Near-Surface Smoke ($\mu\text{g}/\text{m}^3$), 10m Wind (kt)

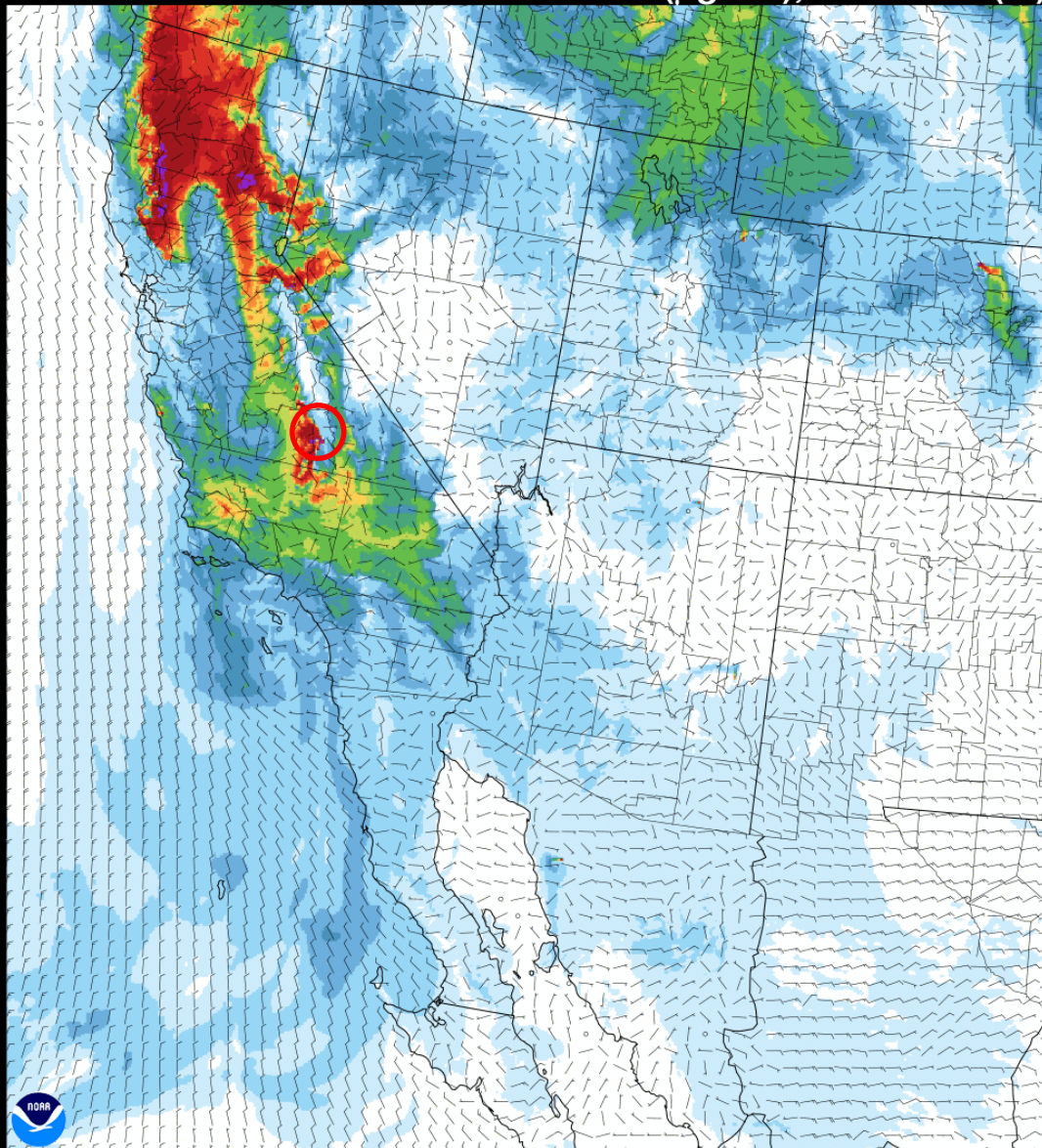


Figure 19 - HRRR-smoke model for Near-Surface Smoke for 1100 PDT

HRRR-SMOKE 2020-09-04 18 UTC 0h fcst - Experimental/valid 09/04/2020 18:00 UTC
 1000 ft AGL Smoke ($\mu\text{g}/\text{m}^3$), Wind (kt)

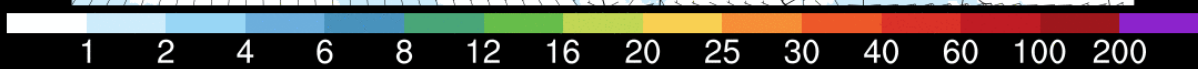
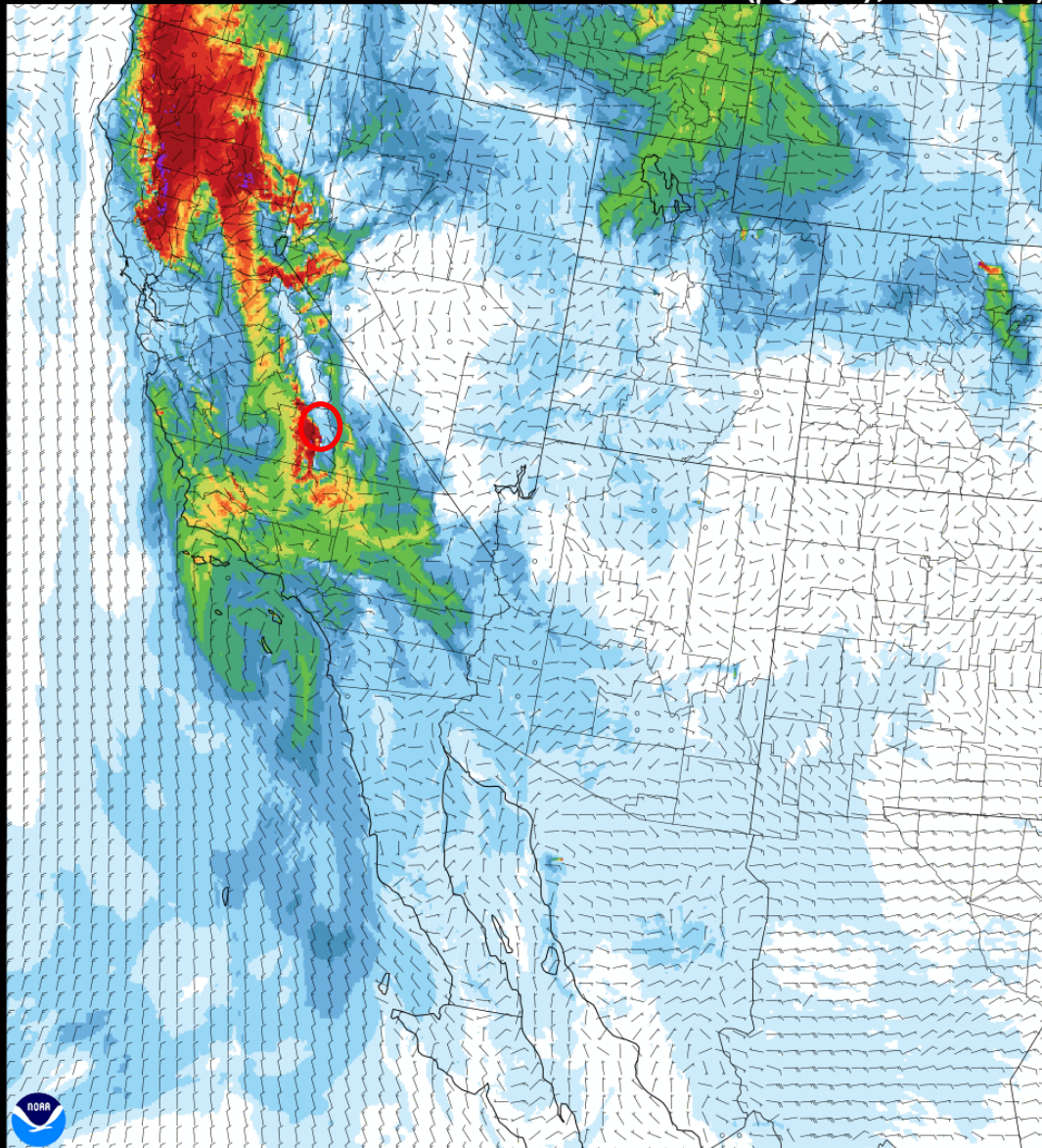


Figure 20 – HRRR-smoke model 1,000 ft AGL Smoke for 1100 PDT

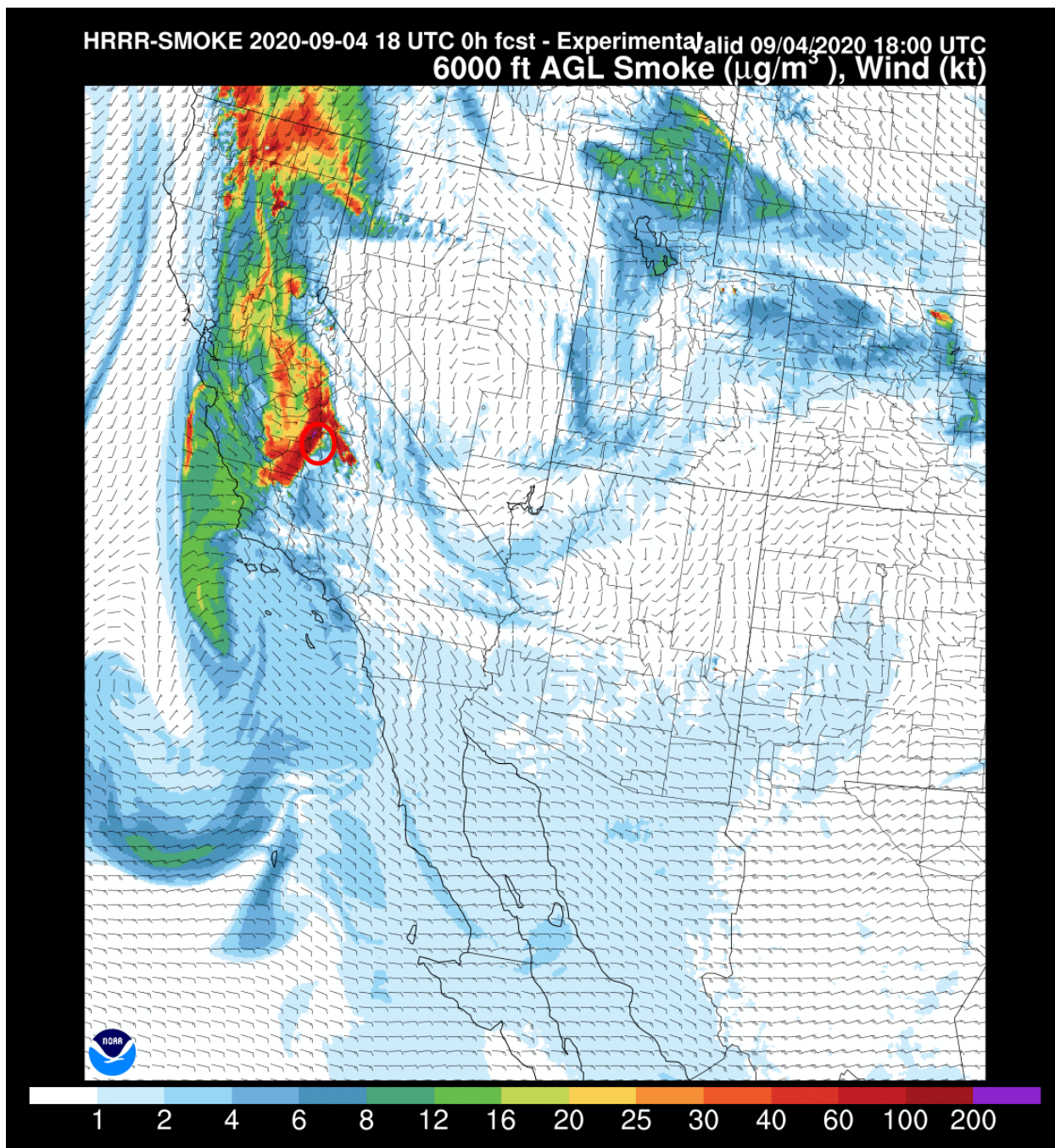


Figure 21 - HRRR-smoke model for 6,000 ft AGL Smoke for 1100 PDT

10.0 Weather Briefing

A search of the Federal Aviation Administration (FAA) contract Automated Flight Service Station (AFSS) provider Leidos indicated that they had no contact with the pilot of N818S on September 4, 2020 for weather briefing, flight plans, or inflight contacts. A search of ForeFlight also indicated that they had no contact with the pilot during the period.

Submitted by:

Don Eick
Senior Meteorologist