Exceptional Events Demonstration for Ozone Exceedances

Eastern Portion of San Luis Obispo County, California

August 2018 Wildfire Events

September 3, 2021

Contents

Acronyms

AOD	Aerosol Optical Depth
APCD	Air Pollution Control District
AQMD	Air Quality Management District
AQS ID	U.S. EPA Air Quality System Identification
BLM	Bureau of Land Management
CAA	Clean Air Act
CalFire	California Department of Forestry and Fire Protection
CARB	California Air Resources Board
CFR	Code of Federal Regulations
CMAQ	Community Multiscale Air Quality
CMAS	Community Modeling and Analysis System
CO	Carbon Monoxide
DV	Design Value
EER	Exceptional Events Rule
F	Fahrenheit
FCCS	Fuel Characteristic Classification System
FEMA	Federal Emergency Management Agency
FEPS	Fire Emissions Production Simulator
FR	Federal Register
FRAP	Fire and Resource Assessment Program
GIS	Geographic Information System
HMS	(NOAA) Hazard and Mapping System
HYSPLIT	Hybrid Single Particle Lagrangian Integrated Trajectory
ISU	Iowa State University
LOX	NWS Los Angeles/Oxnard office
m	meters
mb	millibars
MODIS	Moderate Resolution Imaging Spectroradiometer
mph	miles per hour
NAAPS	Navy Aerosol Analysis and Prediction System
NAAQS	National Ambient Air Quality Standard(s)
NASA	National Aeronautics and Space Administration
NCAR	National Center for Atmospheric Research
NIFC	National Interagency Fire Center
NO	Nitrogen Oxide
NO_2	Nitrogen Dioxide
NOAA	National Oceanic and Atmospheric Administration
NOx	Oxides of Nitrogen
NPP	National Polar-orbiting Partnership
NPS	National Park Service
NWCC	Northwest Interagency Coordination Center
NWS	National Weather Service

O_3	Ozone
PM	Particulate Matter
PM_{10}	Particulate Matter less than or equal to 10 microns in aerodynamic diameter
$PM_{2.5}$	Particulate Matter less than or equal to 2.5 microns in aerodynamic diameter
POC	Parameter Occurrence Code
ppm	parts per million
PQAO	Primary Quality Assurance Organization
PST	Pacific Standard Time
Q/D	Emissions divided by Distance
ROG	Reactive Organic Gas, used interchangeably with Volatile Organic Compound (VOC) in this report
SF2	SmartFire2
SIP	State Implementation Plan
SMOKE	Sparse Matrix Operator Kernel Emissions
SPECIATE	U.S. EPA repository of organic gas and particulate matter speciation emission source profiles
SSEC	Space Science and Engineering Center
UNC	University of North Carolina
U.S. EPA	United States Environmental Protection Agency
USDA	United States Department of Agriculture
UTC	Coordinated Universal Time
UWM	University of Wisconsin, Madison
VOC	Volatile Organic Compound
WRCC	Western Regional Climate Center

Overview/Introduction

During the summer of 2018, extreme fuel conditions in California created an extreme fire season affecting almost all of Northern California, and large portions of Southern California (Figure 1-1), with smoke and haze lingering for weeks. As expected, numerous monitoring sites recorded elevated particulate matter (PM) concentration levels, with many days above the National Ambient Air Quality Standards (NAAQS or standard) for both $PM_{2.5}$ and PM_{10}. Ozone concentrations were also impacted, with levels above and beyond that normally seen during the summer high ozone season.

Figure 1-1: NASA/NOAA Suomi NPP satellite image - August 7, 2018[1]

[1] *NASA Worldview*, accessed 6/18/21

I. NAAQS and Attainment Status

To protect public health and the environment, the U.S. Environmental Protection Agency (U.S. EPA) has set a NAAQS for ozone (O_3) that specifies the maximum allowed concentration to be present in outdoor ambient air. The national ozone standard, first being set in 1979, has been periodically reviewed and revised, resulting in stricter standards set at lower and lower concentrations. Areas determined not to meet these standards are considered nonattainment areas. An 8-hour ozone standard was initially promulgated in 1997, and further revised in 2008 and 2015 as noted in Table 1-1. Due to its high population, urban density, and unique geography, California is home to a significant number of ozone nonattainment areas.

Table 1-1: 8-Hour Ozone NAAQS

Final Rule/Decision	Level (ppm – parts per million)
1997	0.08
2008	0.075
2015	0.070

The Eastern Portion of San Luis Obispo County was designated as a Marginal nonattainment area for the 2015 Ozone NAAQS. The site(s) and upcoming regulatory determination(s) impacted by events in this document are indicated in Table 1-2.

Table 1-2: Ozone Nonattainment Areas and Regulatory Determinations

Nonattainment Area	Ozone NAAQS	Classification	Regulatory Determination	Impacted Site	AQS ID
San Luis Obispo (Eastern Portion)	2015	Marginal	Attainment	Red Hills	06-079-8005

II. Clean Air Act and Exceptional Event Rule Requirements

The Clean Air Act (CAA)[2] defines an exceptional event collectively as the following:

1. The event affected air quality;
2. The event was not reasonably controllable or preventable;
3. The event was caused by human activity that is unlikely to recur at a particular location or was a natural event; and
4. There exists a clear causal relationship between the specific event and the monitored exceedance.

On October 3, 2016, U.S. EPA finalized revisions to the "Treatment of Data Influenced by Exceptional Events",[3] also known as the Exceptional Events Rule (EER). These regulations govern exclusion of event-influenced air quality data from certain regulatory determinations

[2] *Clean Air Act Section 319(b). 42 U.S.C. Section 7619*

[3] U.S. EPA, *Treatment of Data Influenced by Exceptional Events*, 81 FR 68216

of the U.S. EPA Administrator under the CAA. Regulatory determinations applicable under the revised EER are:

- An action to designate or redesignate an area as attainment, unclassifiable/attainment, nonattainment, or unclassifiable for a particulate NAAQS;
- The assignment or re-assignment of a classification category to a nonattainment area;
- A determination regarding whether a nonattainment area has attained a NAAQS by its CAA deadline, including a "clean data determination";
- A determination that an area has data for the specific NAAQS that qualify the area for an attainment date extension under the CAA provisions;
- A finding of SIP inadequacy leading to a SIP call; and
- Other actions on a case-by-case basis.

U.S. EPA regulations[4] state that exceptional events demonstrations must address and include the following elements:

1. A narrative conceptual model;
2. A demonstration that the event was both not reasonably controllable and not reasonably preventable;
3. A demonstration that the event was a human activity unlikely to recur at a particular location or was a natural event; and
4. A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance.

III. Actions Requested

Although a significant number of ozone nonattainment areas were impacted by the historic 2018 wildfires, not all areas have upcoming regulatory determinations applicable under the revised EER. The California Air Resources Board (CARB) is submitting this Exceptional Event demonstration to U.S. EPA for days that impacted the Eastern Portion of San Luis Obispo County ozone nonattainment area in the summer of 2018. These days, along with additional days in 2020 which will be included in a separate document, will affect the upcoming Marginal attainment determination for the 2015 Ozone NAAQS, which has otherwise met the level of the standard. The adjusted design values with and without U.S. EPA concurrence on this document are shown in Figure 1-2 and Table 1-3. Specific exceedances of the ozone 8-hour standard requested for concurrence at the Red Hills monitor in this document are listed in Table 1-4.

[4] 40 CFR 50.14(c)(3)(iv)

Figure 1-2: 8-hour Ozone Design Values at Red Hills

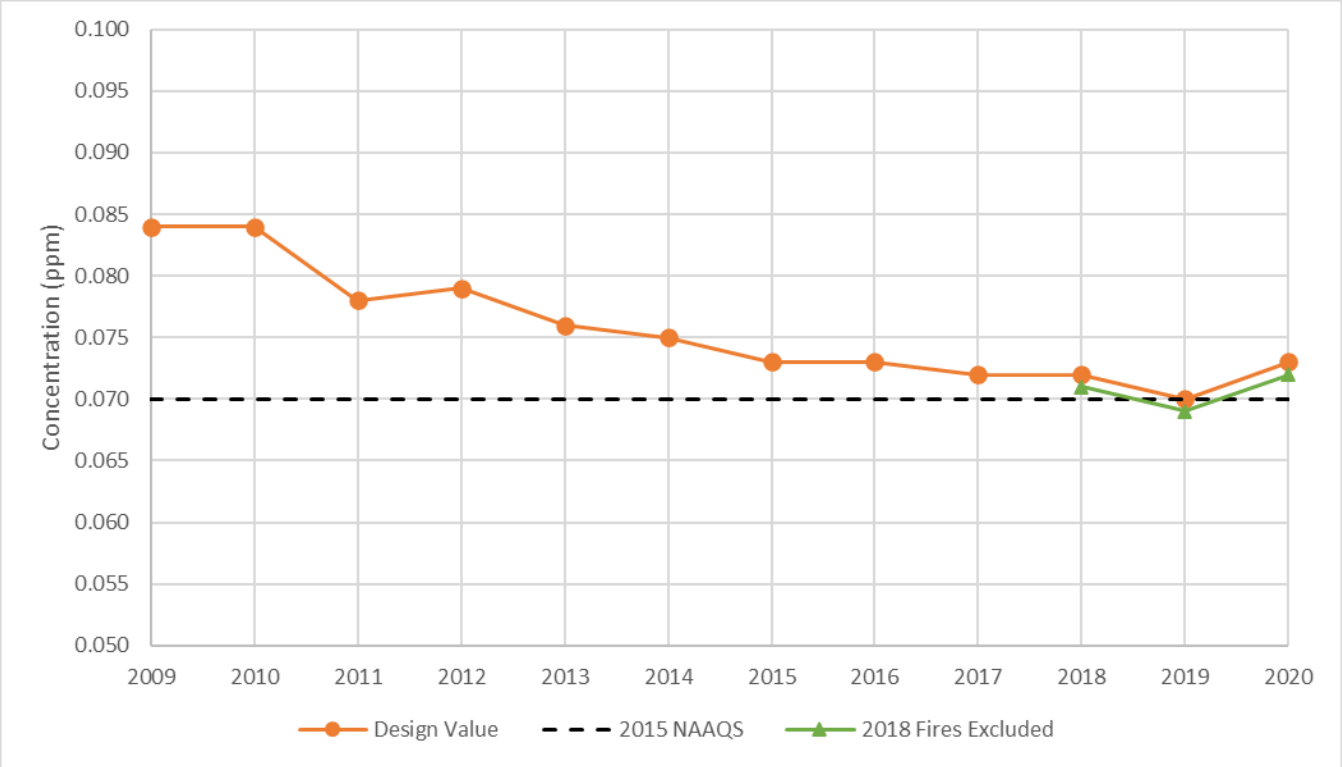


Table 1-3: Summary of 8-hour Design Values (ppm) with and without U.S. EPA Concurrence (2018 events only)

U.S. EPA Determination	2018	2019	2020
Design Value Without Concurrence	0.072	0.070	0.073
Design Value with Concurrence on 2018 Dates	0.071	0.069	0.072

Table 1-4: Summary of 2018 8-Hour Ozone Exceedances Influenced by Wildland Fires

Air District	Monitoring Site	AQS ID	POC	Date	8-Hour Concentration (ppm)
San Luis Obispo	Red Hills	06-079-8005	1	8/3/18	0.073
San Luis Obispo	Red Hills	06-079-8005	1	8/4/18	0.072
San Luis Obispo	Red Hills	06-079-8005	1	8/6/18	0.071
San Luis Obispo	Red Hills	06-079-8005	1	8/7/18	0.071
San Luis Obispo	Red Hills	06-079-8005	1	8/9/18	0.073

Background

California is divided geographically into air basins to manage the air resources of the State on a regional basis. An air basin generally has similar meteorological and geographic conditions throughout. The State is currently divided into 15 air basins, and further

subdivided into 35 local air pollution control districts (APCDs or districts) or air quality management districts (AQMDs or districts).

Almost the entire State of California was impacted by wildfires from July to September of 2018. It is estimated that over 39 percent of the population of the State experienced one or more days impacted by smoke from these fires.

I. Demographics and Geography

The Red Hills monitoring site is located at an altitude of 700 meters in a rural, agricultural area in San Luis Obispo County. The area is part of the Red Hills range in the California Coastal Range. The closest populated areas are Shandon, a small town (population of approximately 1,300) located ten miles west. The larger town of Paso Robles, located an additional 15 miles further west, has a population of approximately 32,000.

II. Climate

The eastern portion of San Luis Obispo, as recorded at the Paso Robles Municipal Airport, experiences mild winters and warm summers, with most precipitation falling from November to March (Table 2-1). The average annual precipitation is 12.53 inches (1948-2012 climate normals).[5]

Table 2-1: Monthly Mean Temperature and Precipitation (1948-2012)

Month	Mean Maximum Temperature (F)	Mean Minimum Temperature (F)	Mean Temperature (F)	Mean Precipitation (inches)
January	59.6	34.2	46.9	2.73
February	62.8	37.2	50	2.46
March	66.3	38.9	52.6	2.17
April	72.7	40.8	56.7	0.91
May	80.3	45.5	62.9	0.26
June	87.7	50.1	68.9	0.02
July	93.8	53.7	73.7	0.02
August	93.5	53.2	73.4	0.04
September	89.1	50.4	69.8	0.21
October	79.9	44.3	62.1	0.52
November	67.8	37.6	52.7	1.19
December	59.9	33.3	56.6	2.01

A significant portion of the State of California experienced higher than average temperatures and lower than average precipitation in the year leading up to the summer of 2018 (Figure 2-1). From March to May (Figure 2-2), however, above average precipitation was recorded in northern and central California, leading to early vegetative growth before below average

[5] WRCC, *Cooperative Climatological Data Summaries*, last accessed 7/29/21

precipitation levels again prevailed. These conditions increased the potential for wildfires in those areas.

Figure 2-1: Average Temperature and Precipitation Ranks, September 2017-August 2018[6]

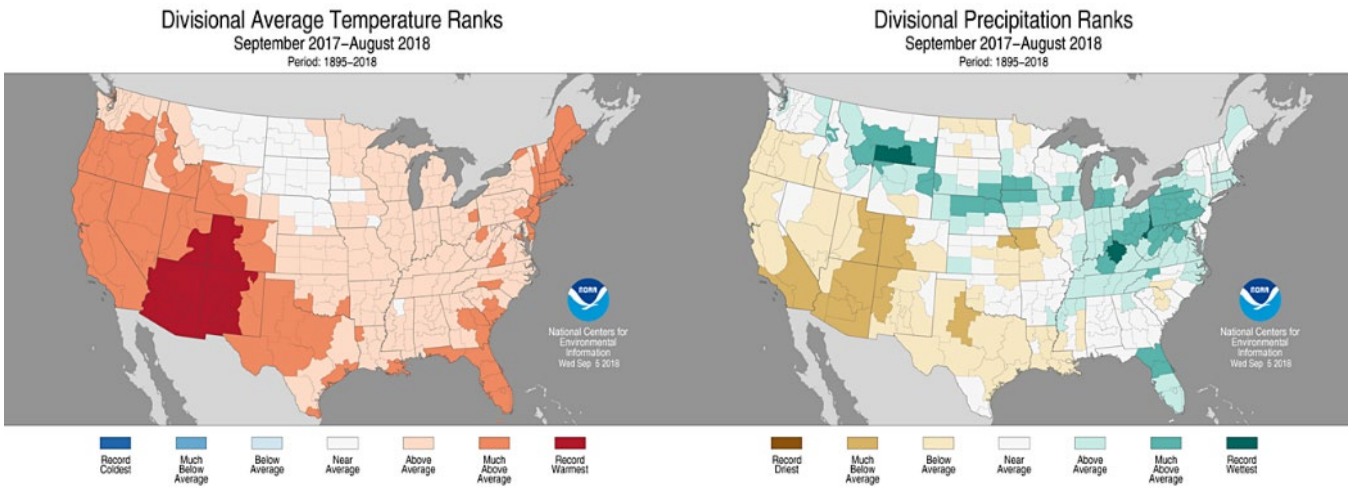
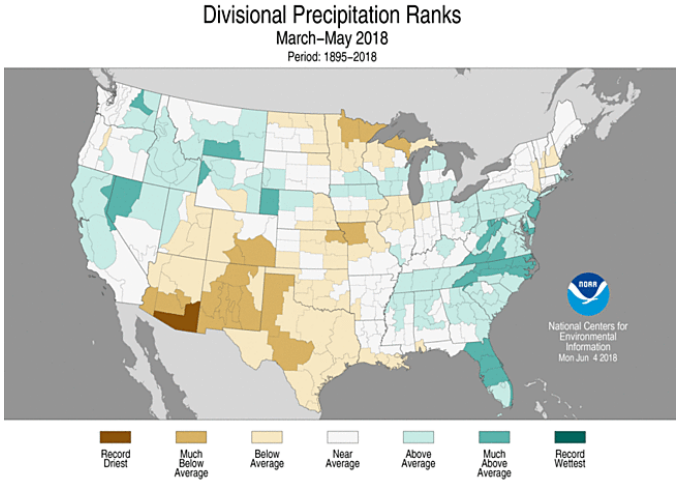


Figure 2-2: Average Precipitation Ranks, March-May 2018[6]



III. Overview of Monitoring Network

The CARB Primary Quality Assurance Organization (PQAO) is comprised of 32 of the 35 air districts in California. The three remaining districts, the Bay Area AQMD, San Diego County APCD, and South Coast AQMD, represent their own PQAOs.

California's ambient air monitoring network includes over 250 sites and more than 700 monitors, making it one of the most extensive in the world. Many regions in California are

[6] NOAA, *National Temperature and Precipitation Maps*, last accessed 7/29/21

characterized by complex terrain, variable meteorological conditions, and diverse emission sources. A large monitoring network is critical for assessing the State's progress in meeting clean air objectives, understanding spatial and temporal variation in air pollutants, and evaluating pollutant exposure. Monitors are operated by CARB, districts, and other entities including the National Park Service (NPS), private contractors, and tribal authorities. A map showing current ozone monitoring in the South Central Coast Air Basin, including San Luis Obispo County, is shown in Figure 2-3. There are two ozone monitoring sites in the nonattainment area: Red Hills (denoted as #1) and Carrizo Plains (denoted as #5). Red Hills is the design value site for the area.

Figure 2-3: Ozone Monitoring in South Central Coast Air Basin

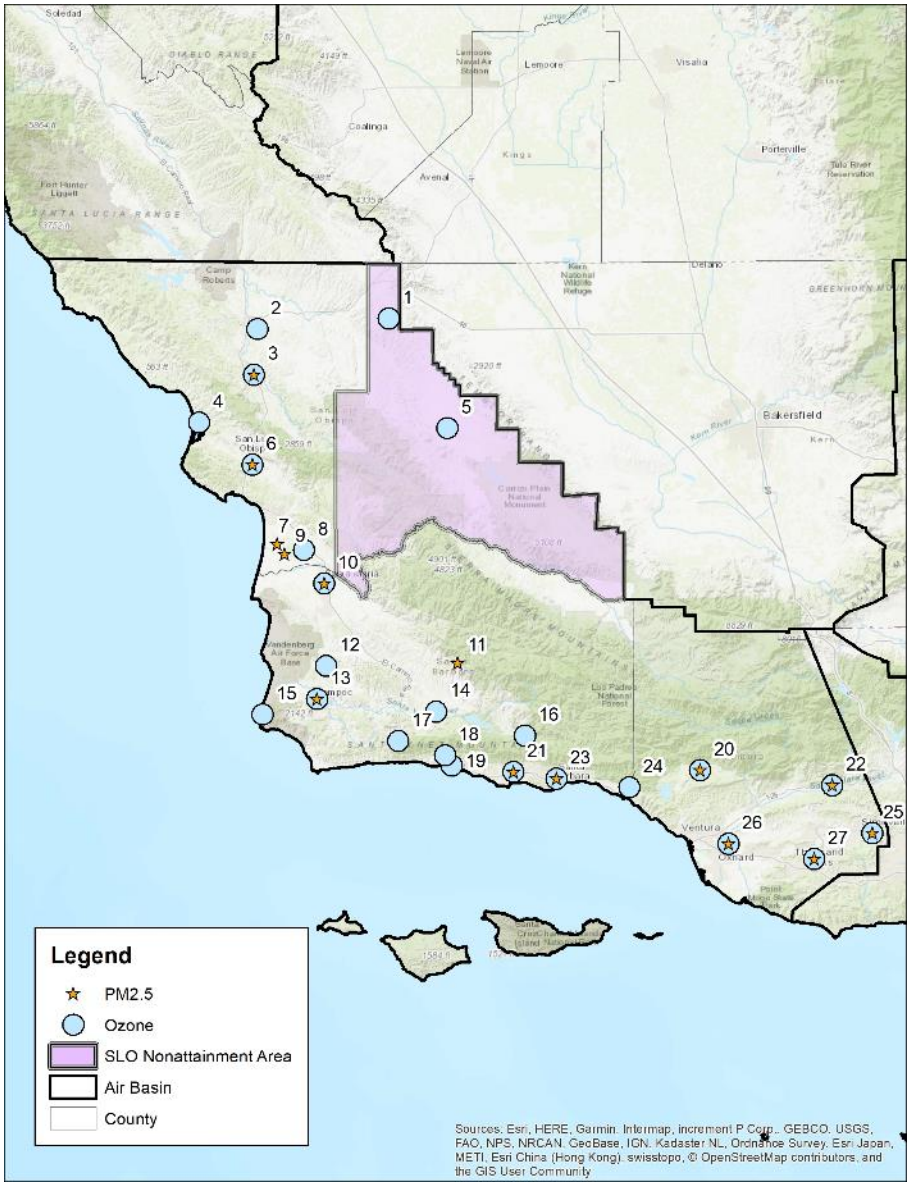


Table 2-2: Monitoring Sites in South Central Coast Air Basin

Number	Monitoring Site	Ozone	$PM_{2.5}$	PM_{10}	NO_2	SO_2	CO	Total Hydrocarbons	$PM_{2.5}$ Speciation	Meteorology
1	Red Hills	X								X
2	Paso Robles	X		X						X
3	Atascadero	X	X	X	X					X
4	Morro Bay	X								X
5	Carrizo Plains School	X								X
6	San Luis Obispo - Higuera	X	X	X						X
7	Arroyo Grande		X	X						X
8	Nipomo-Regional Park	X		X	X					X
9	Nipomo-Guadalupe		X	X		X				X
10	Santa Maria	X	X	X	X		X			X
11	San Rafael Wilderness		X	X					X	
12	Lompoc HS&P	X			X	X		X		X
13	Lompoc S H Street	X	X	X	X	X	X			X
14	Santa Ynez-Airport	X								
15	Vandenberg AFB	X		X	X	X	X	X		X
16	Paradise Road-Los Padres	X			X					X
17	Gaviota GTC Site B	X			X					X
18	Las Flores Canyon #1	X		X	X	X	X	X		X
19	El Capitan Beach	X		X	X	X		X		X
20	Ojai	X	X							X
21	Goleta-Fairview	X	X	X						X
22	Piru - Pacific	X	X							X
23	Santa Barbara 700 East Canon	X	X	X						X
24	Carpinteria	X			X					X
25	Simi Valley-Cochran	X	X	X	X					X
26	El Rio-Rio Mesa	X	X	X	X					X
27	Thousand Oaks	X	X							X

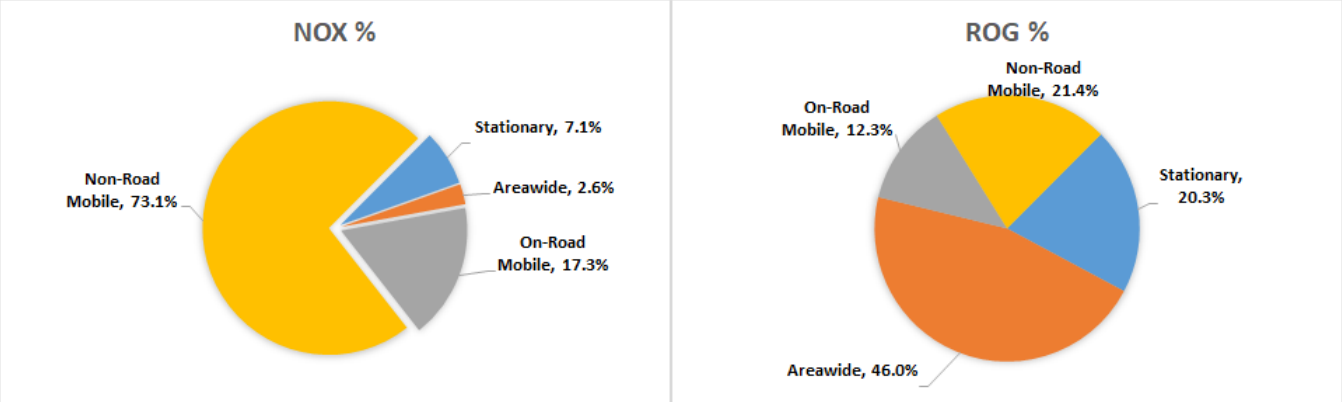
The San Luis Obispo County APCD's ambient air monitoring network meets the minimum monitoring requirements for all criteria pollutants pursuant to Title 40, Part 58 of the Code of Federal Regulations (CFR), Appendix D. San Luis Obispo County's monitoring network is reviewed annually to fulfill the requirements of 40 CFR 58.10 to ensure the network meets the monitoring objectives defined in 40 CFR 58, Appendix D. Data was collected and quality assured as per 40 CFR 58 and submitted to the Air Quality System (AQS).

The San Luis Obispo County APCD also operates a $PM_{2.5}$ Purple Air sensor (SCPR20_Red Hills) at the Red Hills site. The sensor does not fulfill CFR monitoring requirements but can be utilized in more generalized comparison analyses. Primary data for channels A and B were averaged by hour for values of PM2.5_CF1_µg/m^3 to calculate a single sensor based concentration.

IV. Characteristics of Non-Event Ozone Formation

Ground-level ozone is formed by chemical reactions between oxides of nitrogen (NOx) and reactive organic gases (ROG) in the presence of heat and sunlight. San Luis Obispo county emissions estimates are shown in Figure 2-4. Areawide sources is the largest category of anthropogenic (human-caused) ROG emissions; while Non-Road Mobile sources is the largest source of anthropogenic NOx emissions.

Figure 2-4: Anthropogenic Daily NOx and ROG Emissions Estimates for Summer



The highest ozone values occur from May through November, with exceedances during the remainder of the year extremely rare. Ozone concentrations are typically low overnight, peaking in mid-day, with 95 percent of values well below 0.070 ppm (Figure 2-5). The 1-hour ozone concentrations for the event days (Figure 2-6) indicate that ozone concentrations were above the 95 percentile and diverged from the normal diurnal pattern. Daily calibration checks frequently occurred in the fourth hour during the 2013-2017 year period, so this period was excluded from the calculation of percentiles.

Figure 2-5: Typical May-November 1-Hour Ozone Diurnal Pattern at Red Hills (2013-2017)

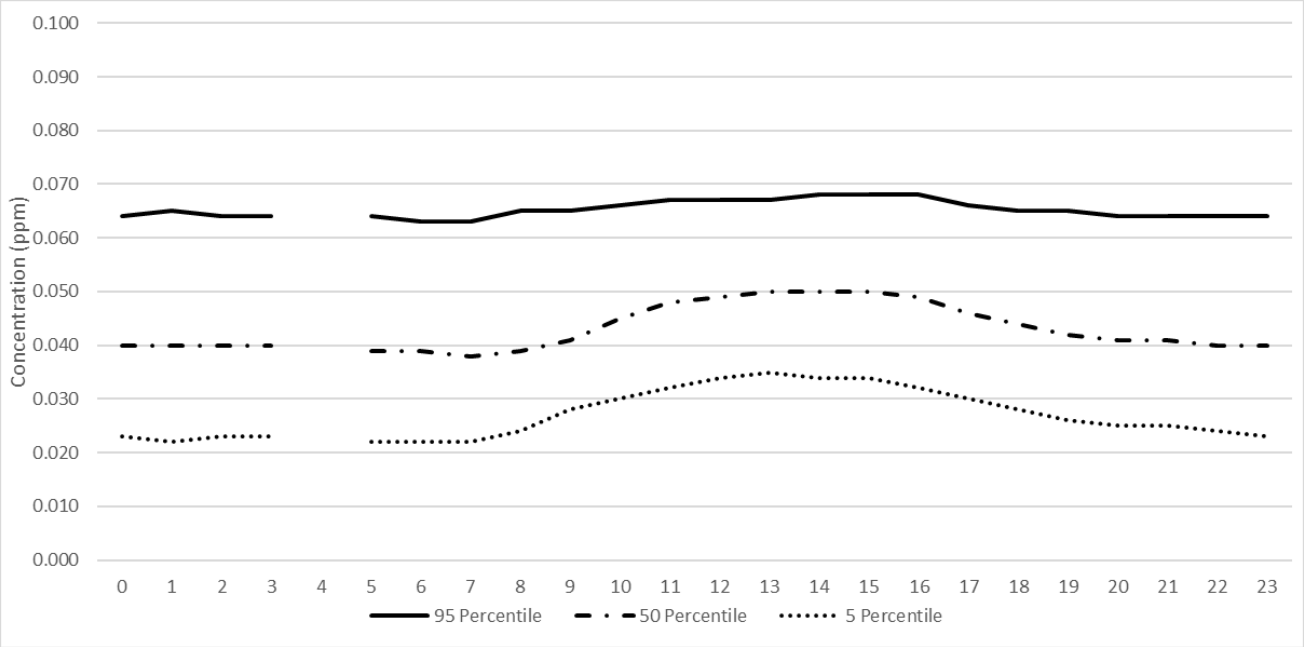
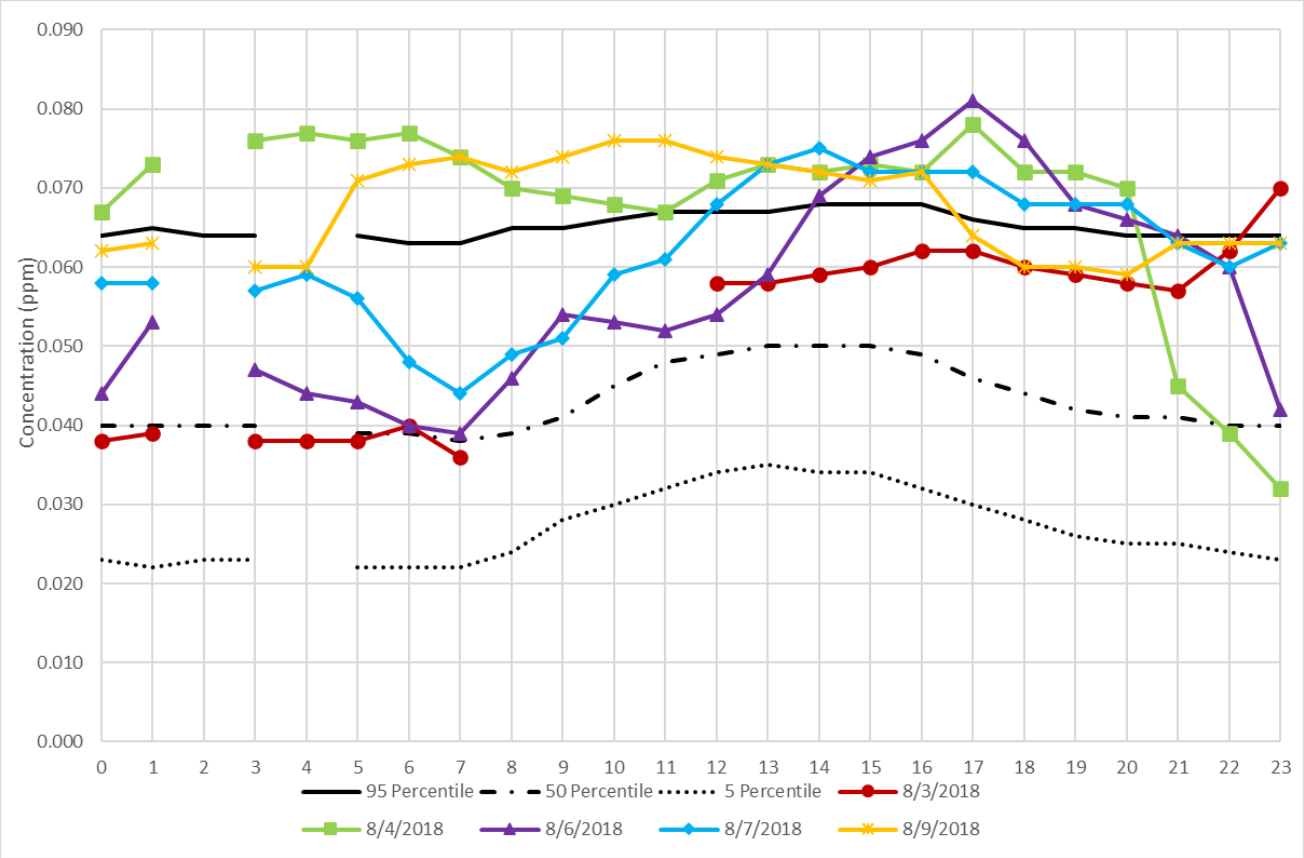


Figure 2-6: 1-Hour Ozone Concentrations during Event Days compared to May-November 2013-2017 Percentiles



The Red Hills site calibration check time was changed by the District to 2am beginning May 3, 2018. Missing hours from 8am-11am on August 3 were due to power failure at the site.

V. Characteristics of Event Ozone Formation

Although wildfires occur in California every year, the number of wildfires and the amount of acreage burned has increased substantially, from an average of less than 5,000 fires burning 200,000 acres,[7] to a record 7,948 incidents and 1,975,086 acres burned in 2018.[8] The impact of these wildfires on air quality has been dramatic. Smoke from large fires has caused extreme concentrations of PM and ozone, especially in the western United States.[9] Wildfires generate large amounts of ozone precursors including NOx and ROG which can contribute to elevated ozone levels in California. However, there are large variations in the amount of emissions (depending on the fuel type and combustion temperature), plume heights, smoke

[7] CalFire, *2017 Statistics and Events (5 year average)*, last accessed 8/20/21
[8] CalFire, *2018 Incident Archive*, last accessed 7/29/21
[9] Gong et al., 2017; Laing and Jaffe, 2019; Mass and Ovens, 2019; Jaffe et al., 2020

density, and meteorological conditions during different wildfires, and all these factors can significantly impact the subsequent ozone production.[10] In addition, the amount of ozone within a smoke plume also varies with distance from the fire.[11] Due to the titration by NO from fire emissions and the blocking of sunlight by PM emissions which hinders photochemical reactions, ozone concentrations near active fires are sometimes even lower relative to baseline concentrations. As the ozone precursors transport downwind along with the other air pollutants such as particulate matter, ozone is produced within the smoke plume which could result in ozone exceedances at the surface in downwind areas. Research studies found that distant wildfires can raise ground-level ozone concentrations to unhealthy levels even at large distances from the fire location.[12] Although increases in $PM_{2.5}$ were noted at sites to the east of the Red Hills monitor, the Atascadero site to the southwest of the Red Hills monitor and sites to the north in the Monterey Peninsula saw only slight increases due to influence from predominantly cleaner marine air within the valleys of the southern Coastal Ranges and along the Pacific coast.

Narrative Conceptual Model – August 3-9, 2018

The Narrative Conceptual Model describes the events causing the exceedances or violations seen at the monitor and includes a discussion of how the events led to concentrations above the NAAQS.

I. Wildfire Information

2018 was an extreme year for wildfires, with numerous wildfires active during the time of the exceedances seen at the Red Hills monitor (Figure 3-1, Table 3-1), although not all the wildfires impacted the monitor on any given day. Changing meteorological conditions brought smoke from distant fires at the Oregon/California border down the coast toward the Red Hills monitor on some days, while others saw influences from wildfires in the northern portion of the State or just to the east in the Sierra Nevada Mountains or even closer in Monterey County. All these fires, however, contributed to the accumulating smoke layers that overlayed California, making identification of the impact of just one wildfire difficult. Most of these fires, and all the megafires, occurred on wildland or in the urban/wildland interface.

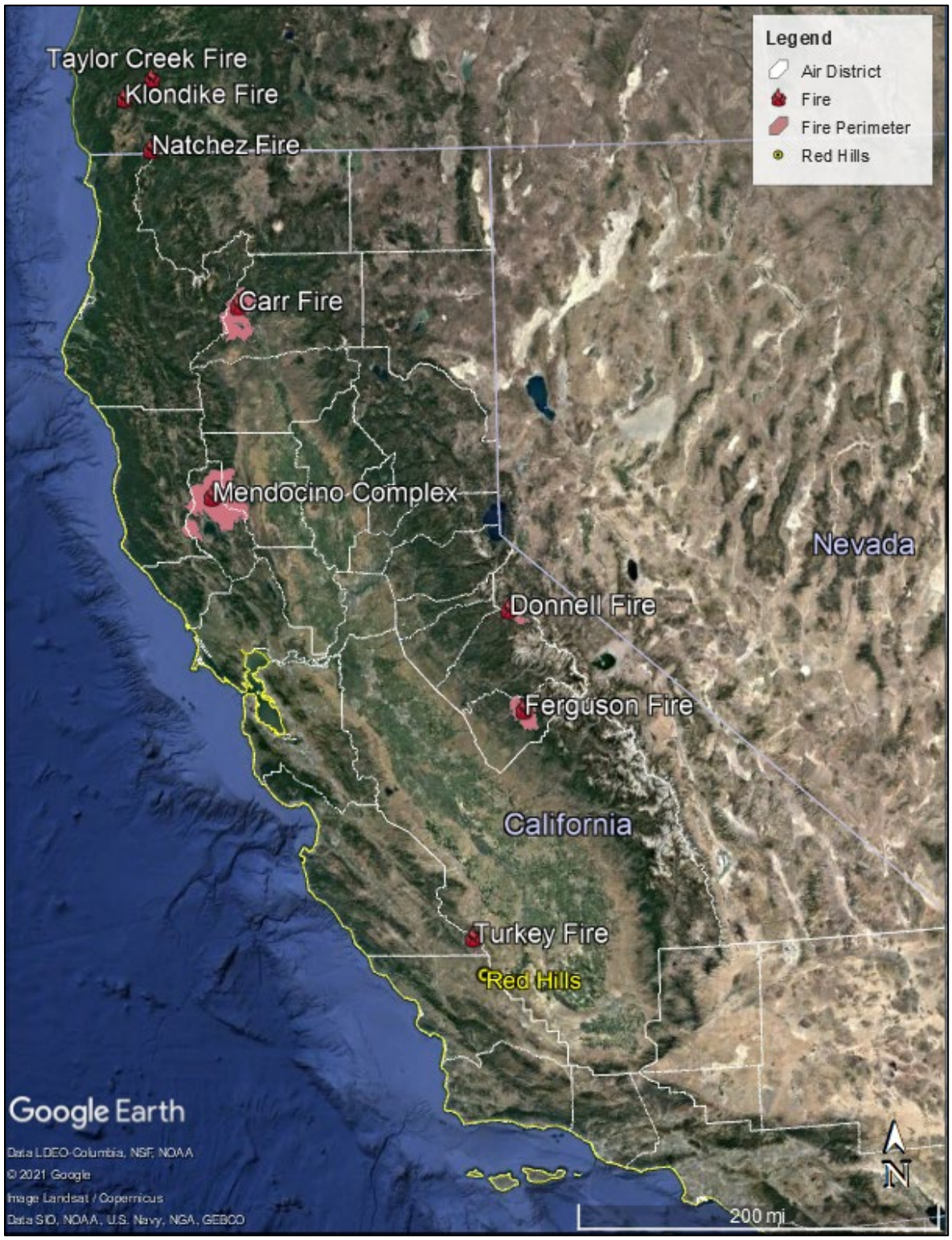
Table 3-1: Major wildfires active during August 2018 event[13]

Fire	Start	Containment	Latitude	Longitude	Total Acres
Ferguson	7/13/18	11/28/18	37.655	-119.886	96,901
Natchez	7/15/18	1/4/19	41.951	-123.546	38,134

[10] Jaffe and Wigder, 2012; Faloona et al., 2020
[11] Faloona et al., 2020
[12] Pfister et al., 2008
[13] CalFire, *2018 Redbook Wildfire Activity Statistics*. Accessed 6/7/2021; USDA Forest Service, Rogue River-Siskiyou National Forest, *Press Release: Klondike Fire Officially Declared 100% Contained*, accessed 6/7/2021.

Fire	Start	Containment	Latitude	Longitude	Total Acres
Klondike	7/16/18	11/28/18	42.369	-123.86	175,528
Taylor Creek	7/16/18	10/11/18	42.528	-123.571	52,389
Carr	7/23/18	8/30/18	40.654	-122.624	229,651
Mendocino Complex (Ranch)	7/27/18	9/19/18	39.243	-123.103	410,203
Mendocino Complex (River)	7/27/18	8/10/18	39.047	-123.120	48,920
Donnell	8/1/18	1/4/19	38.349	-119.929	36,450
Turkey	8/6/18	8/7/18	35.800	-120.330	2,225

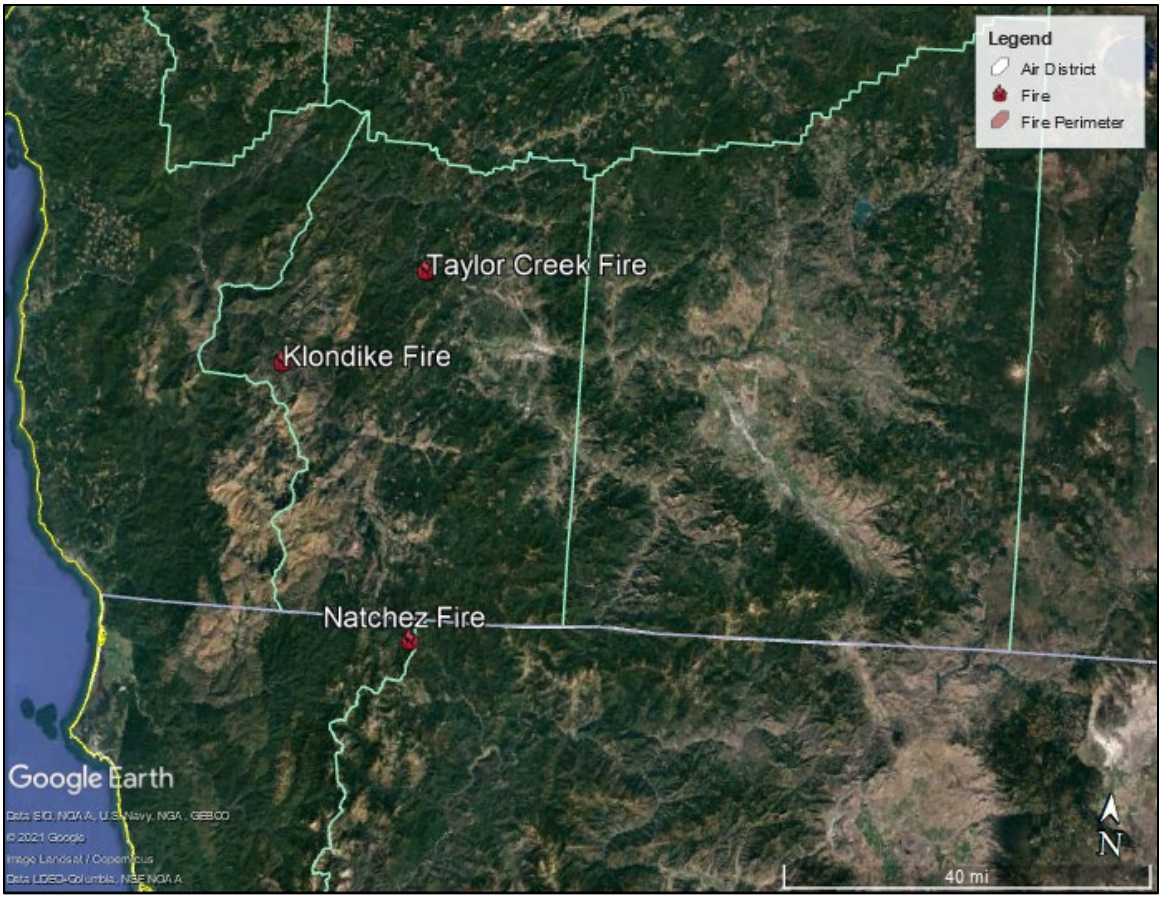
Figure 3-1: August 2018 Wildfires



The Klondike/Taylor Creek wildfire (Figure 3-2) was originally two separate wildfires: Taylor Creek Fire and Klondike Fire[14]. These fires began during a lightning strike on July 15, 2018, and actively burned in the Rogue River-Siskiyou National Forest, although the Taylor Creek fire started on Bureau of Land Management (BLM) land in the Oregon Department of Forestry's protection area.[15] The wildfires eventually merged and burned 228,000 acres before full containment on November 28, 2018.[16]

The Natchez wildfire was also ignited by lightning on July 15, 2018 in the Rogue River-Siskiyou National Forest and consumed 38,134 acres in portions of Siskiyou and Del Norte Counties. The fire was finally contained on October 30, 2018.

Figure 3-2: Klondike, Taylor Creek, and Natchez Fires

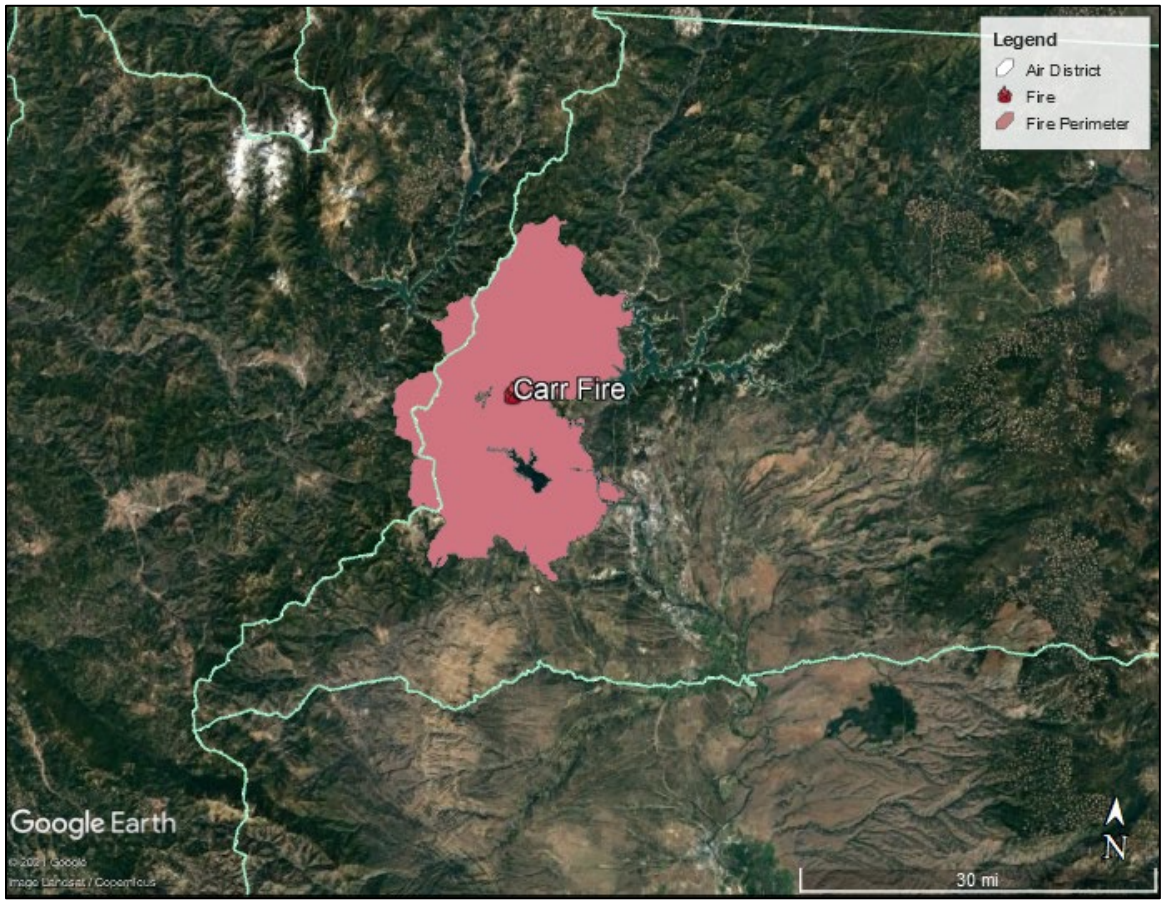


The Carr wildfire (Figure 3-3) was ignited by a vehicle on July 23, 2018 in the Whiskeytown-Shasta Trinity National Recreation Area in Shasta County. The fire rapidly spread, eventually burning 229,651 acres, killing three firefighters and five civilians, and destroying 1,614

[14] USDA Forest Service, Rogue River-Siskiyou National Forest, *Press Release: Klondike Fire Officially Declared 100% Contained*, accessed 6/7/2021
[15] Alaska Incident Management Team, *2018 Taylor Creek Klondike Fires Summary*, last accessed 7/29/21
[16] NWCC, *Northwest Annual Fire Report, 2018*, p.20, last accessed 7/29/21

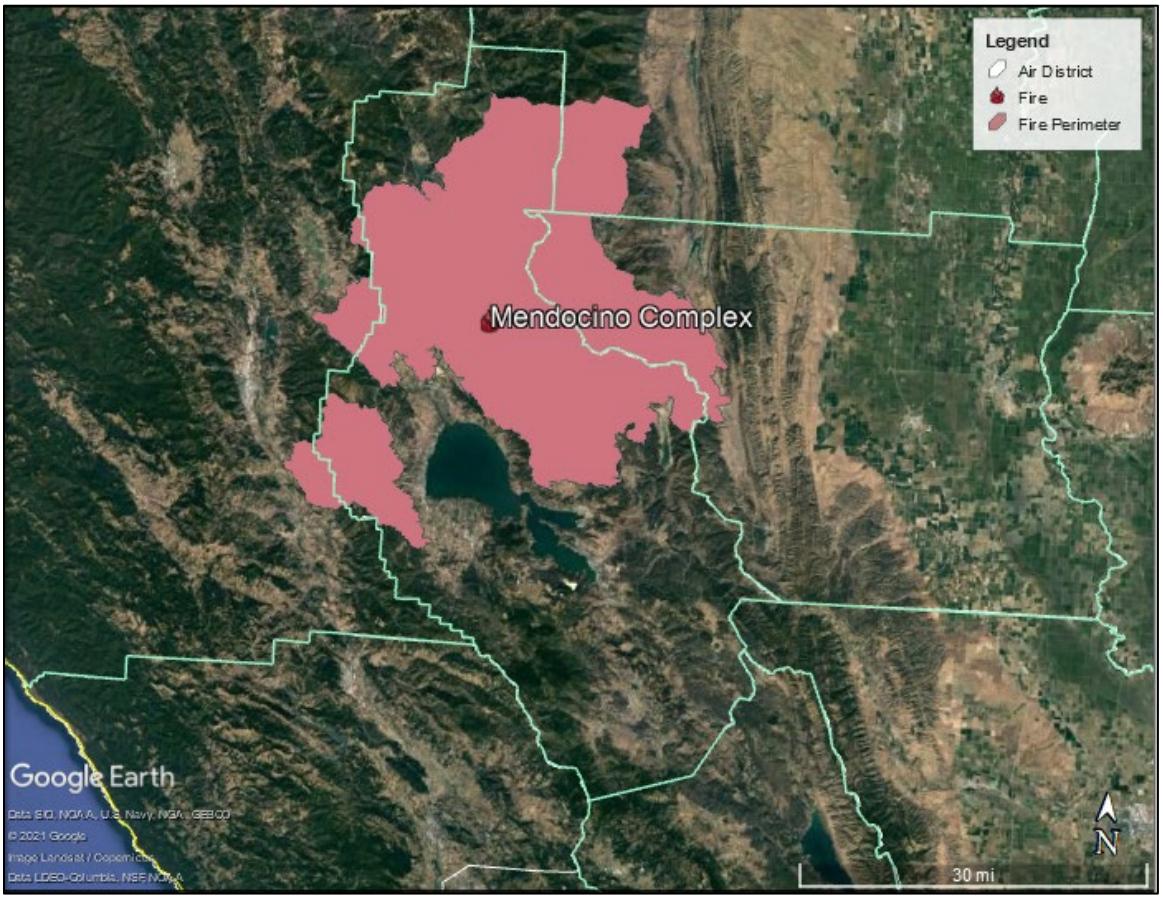
buildings before full containment on August 30, 2018. This was the second largest fire by acreage in 2018.

Figure 3-3: Carr Fire



The Mendocino Complex (Figure 3-4) was the collective name for two large wildfires, Ranch Fire and River Fire, which both started on July 27, 2018 in the Mendocino National Forest. The Ranch Fire, caused by human activities, destroyed 246 structures, killed one firefighter, and eventually burned 410,203 acres within portions of Colusa, Glenn, Lake, and Mendocino Counties before complete containment on August 17, 2018. The River Fire, with an undetermined cause of ignition, destroyed 35 structures and burned 48,920 acres in Colusa, Lake, and Mendocino Counties before containment on September 27, 2018. As of 2018, the Mendocino Complex fire was the largest wildfire to have occurred in California's recorded history with a combined 459,123 burned acres.

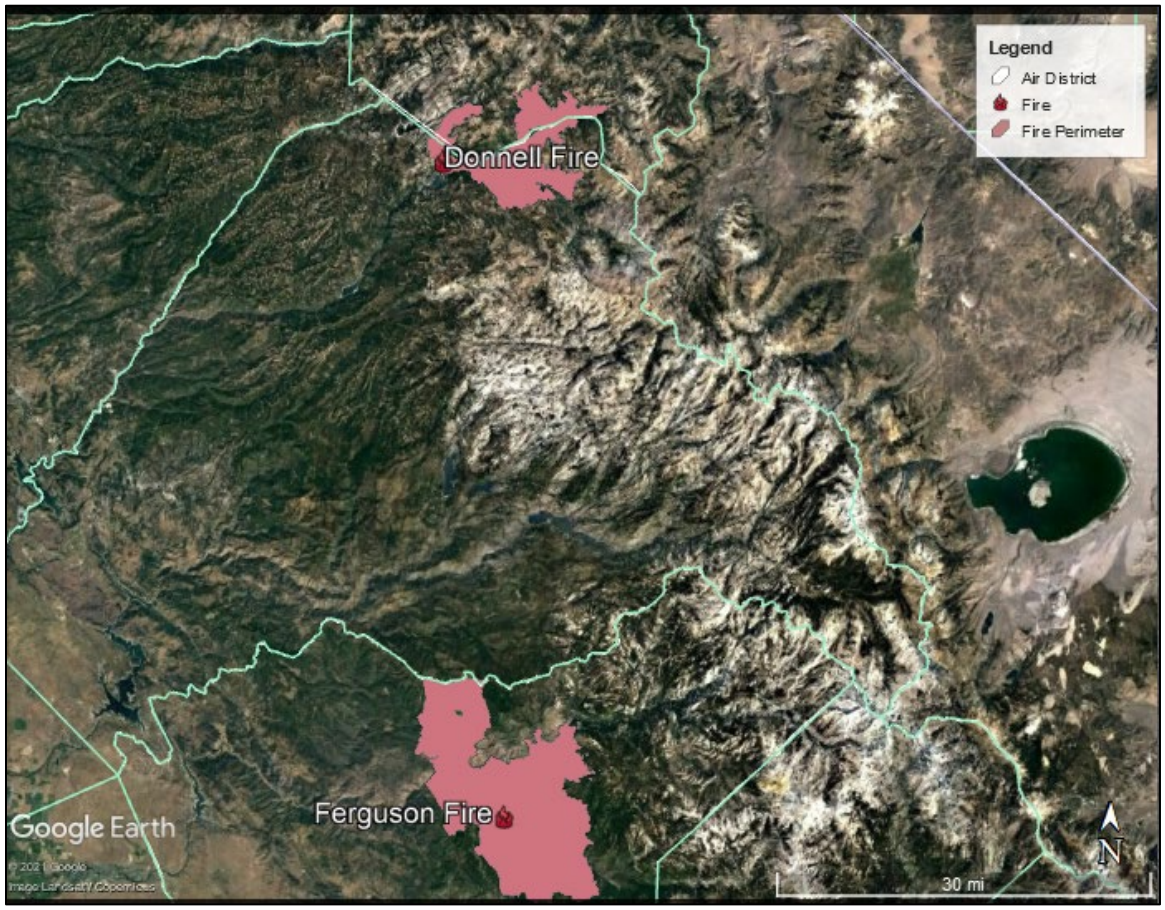
Figure 3-4: Mendocino Complex (Ranch and River Fires)



The Donnell wildfire (Figure 3-5) was ignited in the Carson-Iceberg Wilderness area in the Stanislaus National Forest on August 1, 2018. The fire, cause unknown, consumed 36,450 acres and 135 buildings in Tuolumne County before eventual containment on October 31.

The Ferguson wildfire (Figure 3-5), cause unknown, was ignited on July 13, 2018 in the Sierra National Forest in Mariposa County. The fire burned 96,901 acres, destroyed 11 structures, and killed two firefighters prior to containment on August 22. This was the fifth largest wildfire by acreage in 2018.

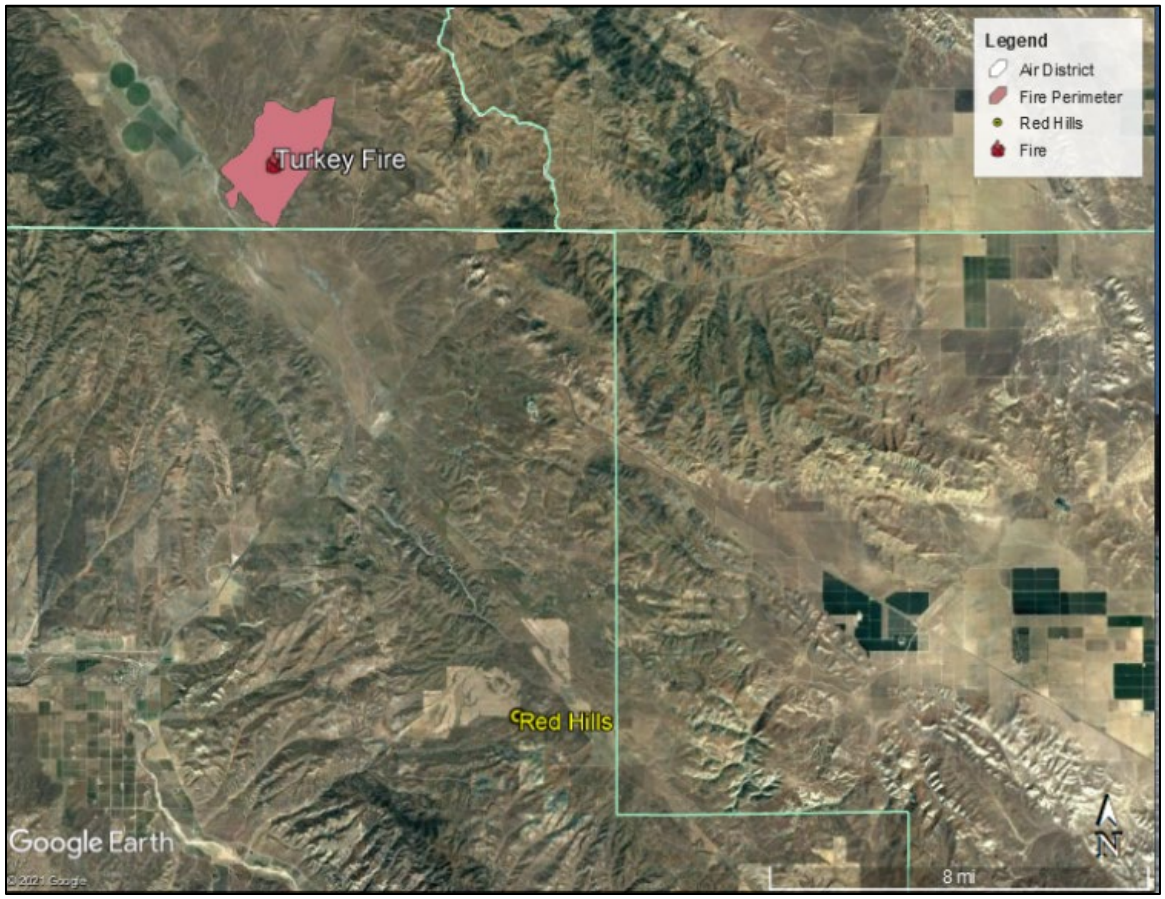
Figure 3-5: Donnell and Ferguson Fires



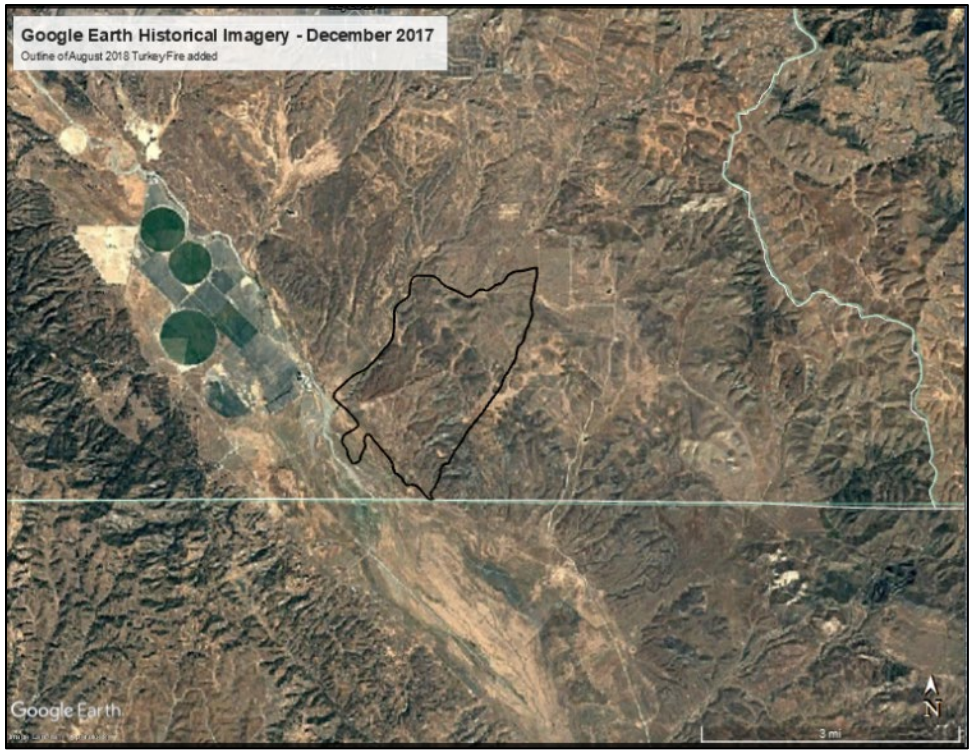
The Turkey Fire (also known as the Turkey Flats Fire, Figure 3-6) was a grassland vegetation fire caused by human activity near the town of Parkfield in Monterey county on August 6. This fire burned 2,225 acres and was contained on August 7. Figures 3-6b and 3-6c show the area before and after the small fire on land with little, if any, development.

Figure 3-6: Turkey Fire with Pre/Post Fire Maps

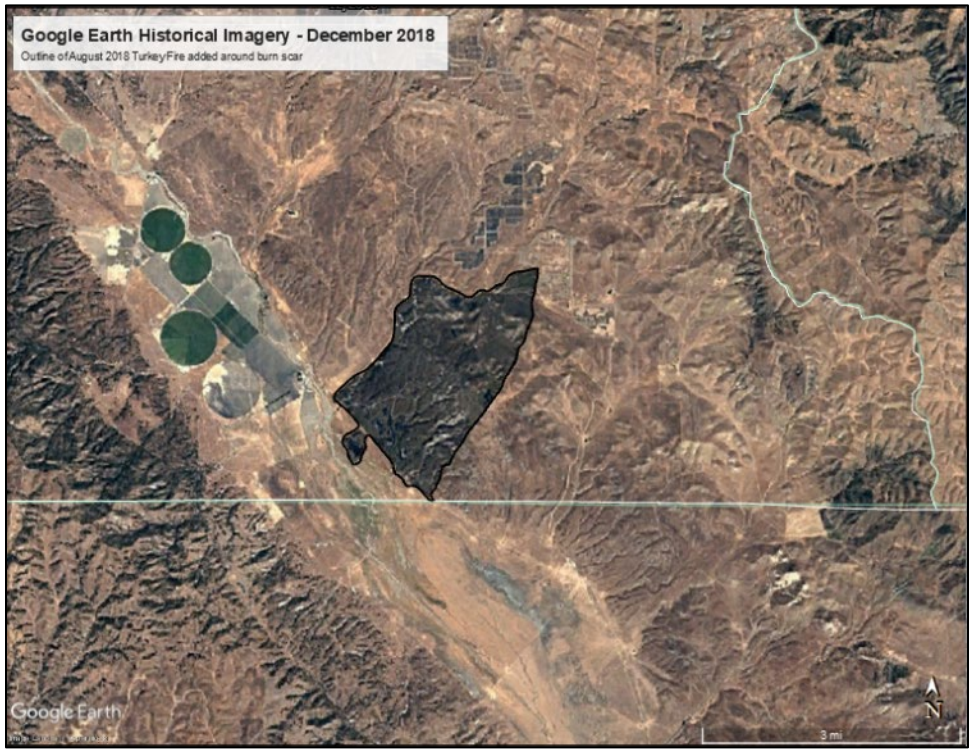
a. Location of Turkey Fire and Red Hills monitoring site



b. Perimeter of future Turkey Fire in undeveloped vegetative area

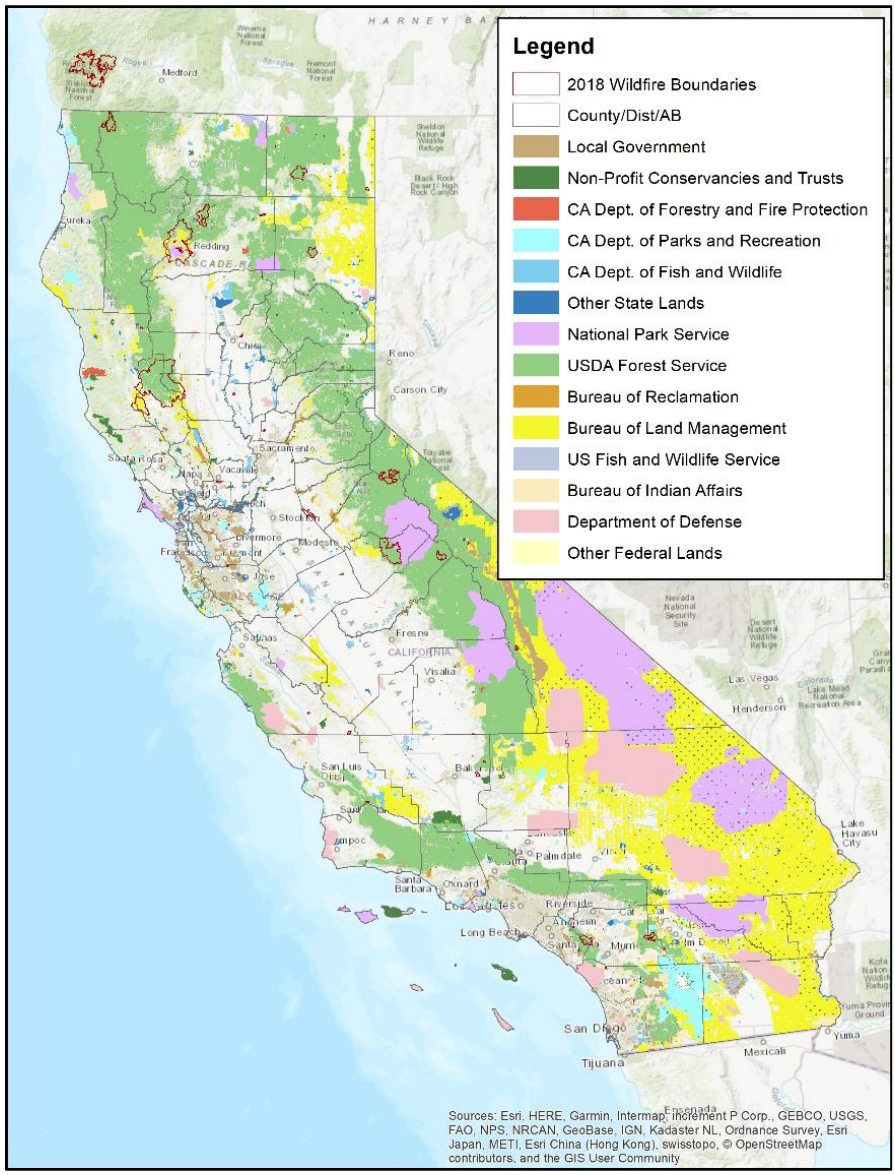


c. Perimeter of past Turkey Fire in burned vegetative area



These fires occurred in areas that meet the definition of wildland which is "an area in which human activity and development is essentially non-existent, except for roads, railroads, power lines, and similar transportation facilities. Structures, if any, are widely scattered." As specified in the Exceptional Events Rule,[17] wildlands can include forestland, shrubland, grassland, and wetlands and includes lands that are predominantly wildland, such as land in the wildland-urban interface. Figures 3-7 and 3-8 indicate some of these areas with the fire perimeters outlined in red.

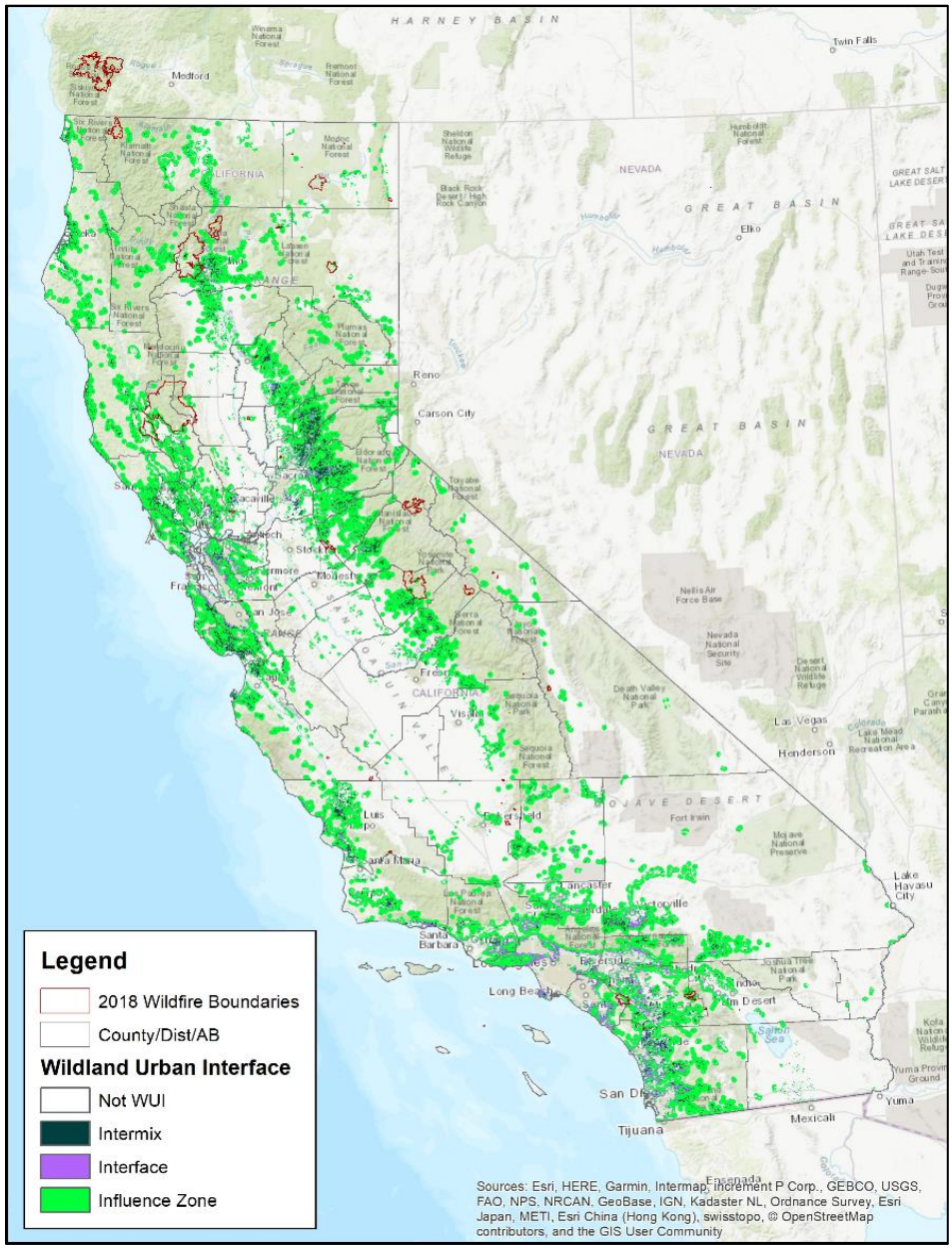
Figure 3-7: California Land Ownership Map with 2018 Wildfire Boundaries (Red)[18]



[17] 81 FR 68248

[18] CalFire, *FRAP GIS Data*, last accessed 7/29/21

Figure 3-8: Wildland-Urban Interface Map with 2018 Wildfire Boundaries (Red)[19]



II. Summary of Event

A series of large wildfires were ignited across California from mid-July to August 2018. Most of these fires occurred in the northern portion of the state, including the Carr Fire, which burned 230,000 acres and resulted in the eight fatalities, and the Mendocino Complex Fire,

[19] CalFire, *FRAP GIS Data*, last accessed 7/29/21

which burned over 450,000 acres with one fatality. On August 4, 2018, a national disaster was declared in Northern California, due to the extensive wildfires burning there.[20]

The following sections provides evidence of the impact of these exceptional events on the Red Hills ozone monitor in San Luis Obispo County from August 3 to August 9, 2018. Presented by event day, the evidence shows the source wildfires that collectively contributed emissions.

NOAA's HYSPLIT[21] model was used to determine simple back-trajectories showing the path that an air parcel took for a specified period of time (here, 48 hours), starting at the Red Hills monitor at times of peak concentrations on each day. Three height levels (red: 100 meters (m); blue: 500m; green: 1000m) were used to indicate transport near the surface and in the upper atmosphere.

The forward dispersion tool of the HYSPLIT model was used to indicate how emissions from the wildfires were transported toward the monitor. The estimated time of arrival from the fire was used to indicate contributing wildfires to the concentrations at the monitor. The HYSPLIT dispersion model was run from each major fire starting 36 hours prior to maximum ozone concentration at the Red Hills site for each date. These dispersion model runs provide for insight into a hypothetical plume of smoke spreading from each fire and the approximate number of hours to reach an area. This provides for a generalized understanding of smoke transport from a fire across a region, connecting a wildfire with smoke in satellite imagery, and finding potential correlations at a site through analysis of plume coverage timing and backwards trajectories when they overlap.

Google Earth[22] was used as a platform to combine the HYSPLIT back-trajectories and the NOAA Hazard and Mapping System (HMS) Fire and Smoke Product[23] smoke layers and fire locations. An additional Google Earth image, showing the HYSPLIT back-trajectories along with visible satellite images from the MODIS[24] Aqua or Terra platforms, is also presented.

Both the HYSPLIT dispersion and trajectory model results, as well as MODIS satellite layers, and HMS smoke plume analyses, show impacts from the wildfires at the Oregon/California border as well as the larger California wildfires dispersed throughout the northern and central portions of the State. Although the model results can show potential influence from specific fires, they do not always show the cumulative effect of continuing wildfire emissions that impacted California in late July and early August. HYSPLIT dispersion results in the following sections are primarily from the fires providing the most impacts on the monitors on the specified day. HYSPLIT trajectory results are primarily from the time of maximum concentrations during the exceeding 8-hour period. Dispersion results from other fires for

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[20] FEMA, *California Wildfires and High Winds, DR-4382-CA,* last accessed 7/29/21
[21] HYbrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT)
[22] *Google Earth*, last accessed 7/29/21
[23] NOAA Hazard and Mapping System (HMS), *Fire and Smoke Text Product*, last accessed 7/29/21
[24] UWM, SSEC, *MODIS Today*, last accessed 7/29/21

each day and trajectory results from other hours during the exceeding 8-hour period can be found in Appendix IV.

A. August 3, 2018

With transported wildfire emissions, sunlight, and warm temperatures along the way, ample ozone was generated, transported, and mixed to the surface at the Red Hills site. This transported ozone from fires listed in Table 3-2 led to ozone increases during the overnight hours of August 3 persisting through August 4.

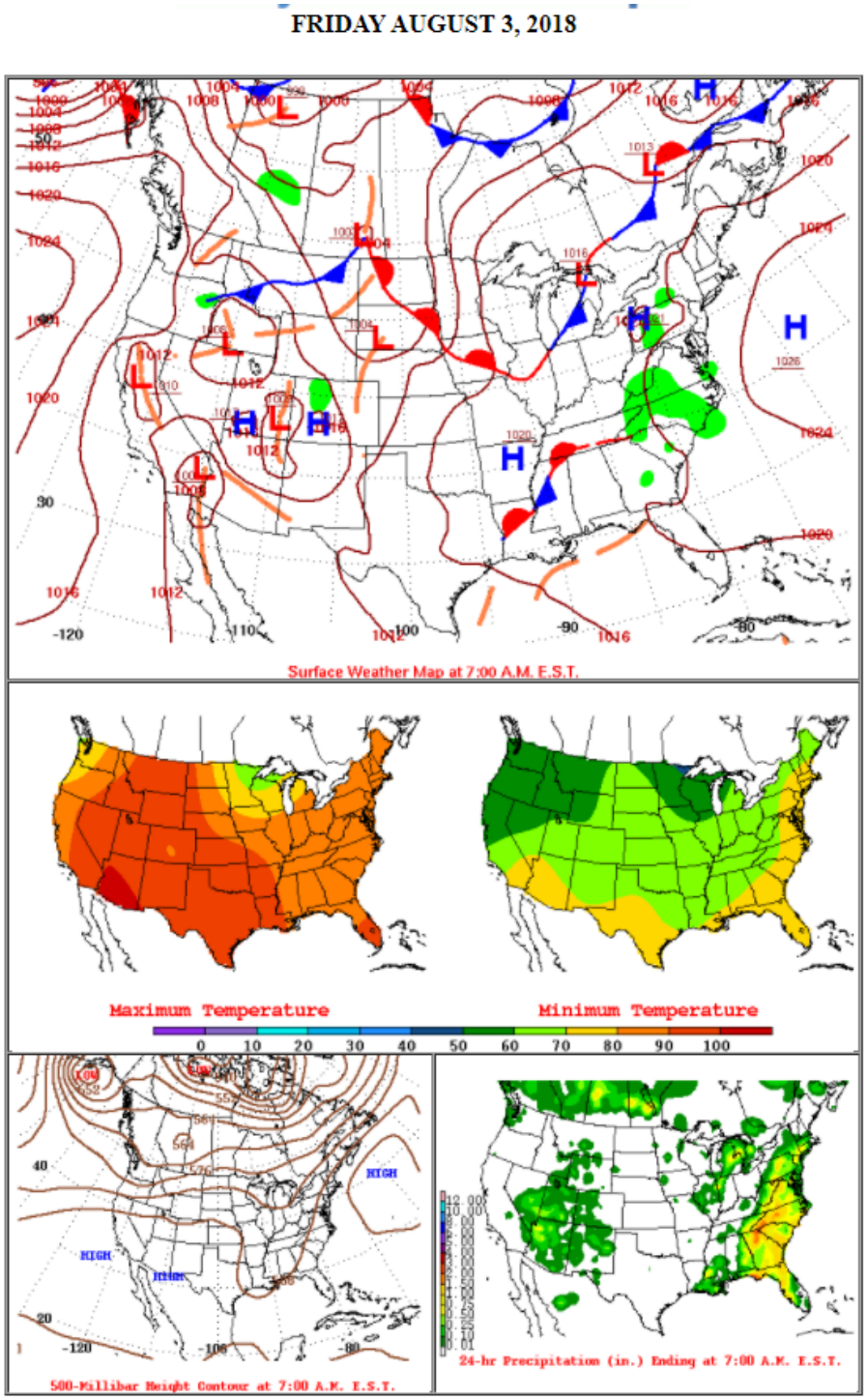
Table 3-2: Major wildfires impacting monitor on August 3, 2018[25]

Fire	Start	Containment	Total Acres	Aug 3 Daily Acres
Natchez	7/15/18	1/4/19	38,134	963
Klondike	7/16/18	11/28/18	175,528	5,352
Taylor Creek	7/16/18	10/11/18	52,389	2,937
Mendocino Complex (Ranch)	7/27/18	9/19/18	410,203	46,015
Mendocino Complex (River)	7/27/18	8/10/18	48,920	3,168

Strong, broad 500 millibar (mb) high pressure over the desert southwest (Figure 3-9) kept conditions favorable for ozone production at the surface in areas not excessively obscured by smoke from above. Dry, warm weather across much of California allowed for active wildfires to continue burning, while strong surface high pressure over the eastern Pacific Ocean generated strong northerlies along the western United States.

[25] Direct communication from Leland Tarnay, PhD Physical Ecologist Forest Service Region 5 Remote Sensing Lab on 7/2/2021 3:45 PM

Figure 3-9: Meteorological conditions on August 3, 2018[26]



[26] NWS, *Daily Weather Maps*, last accessed 7/29/21

Near surface smoke from wildfires originating in southwestern Oregon and along the northern California border was transported down the western California coast during the days preceding the August 3 exceedance. From late August 2 into August 3, this smoke ladened air also moved southward along and over the Southern Coast Ranges, which run north and south from San Francisco to Santa Barbara County, impacting the Red Hills monitor as indicated by the back-trajectories in Figures 3-10a and 3-10b.

Figure 3-10a: August 3, 2018 HYSPLIT back trajectories (starting 8/4/18 00PST) with active fire locations and NOAA HMS smoke plumes

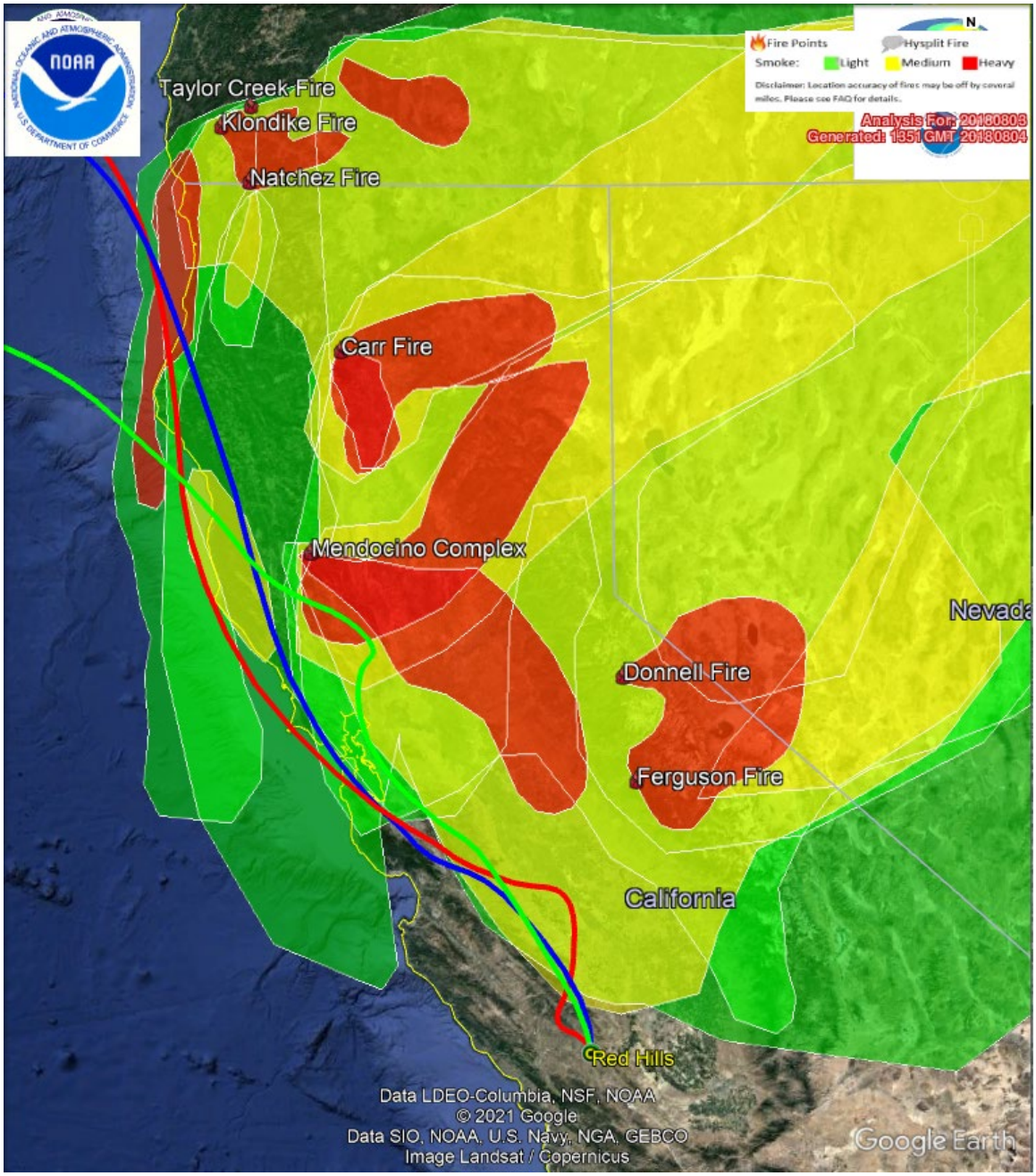
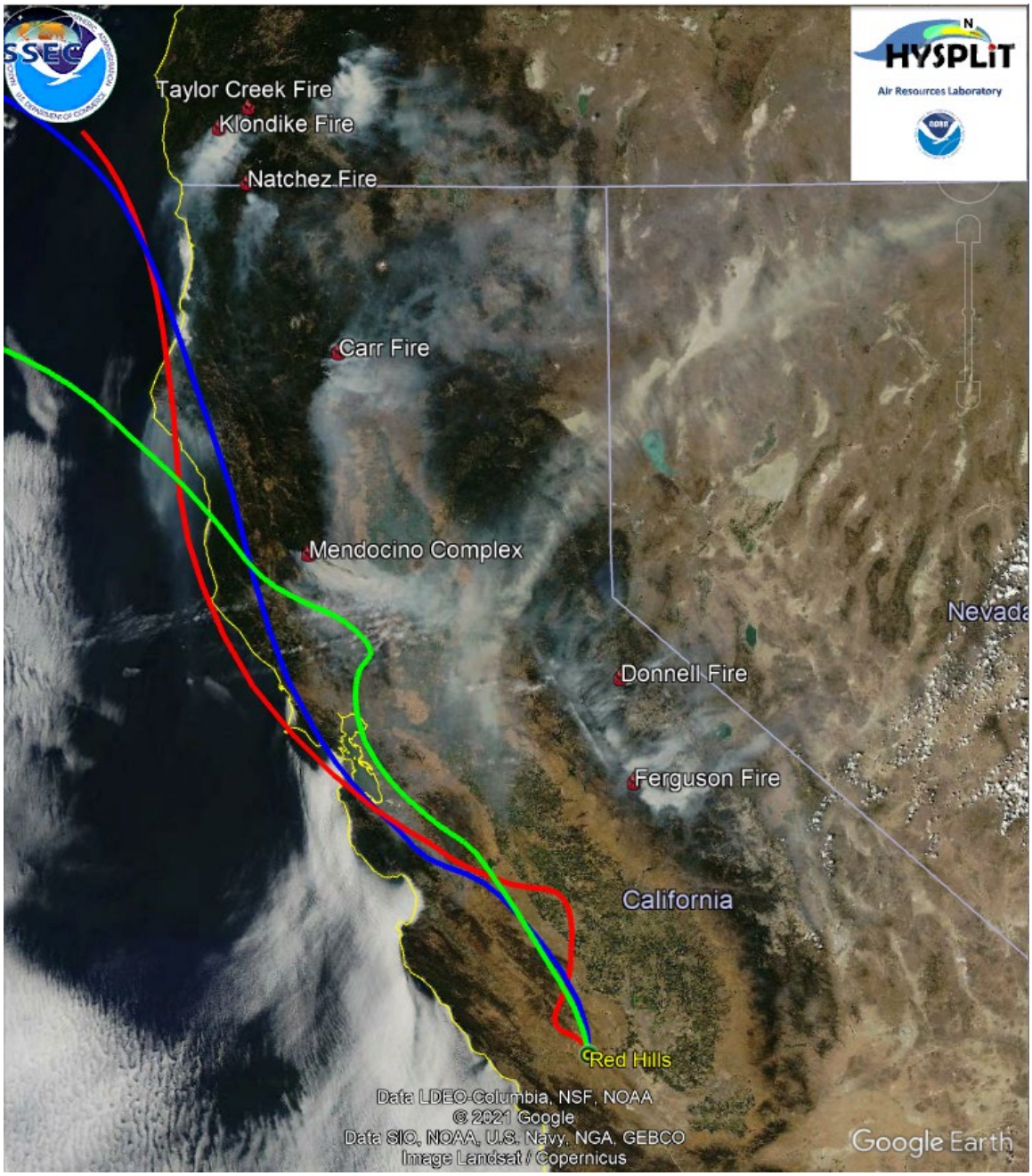
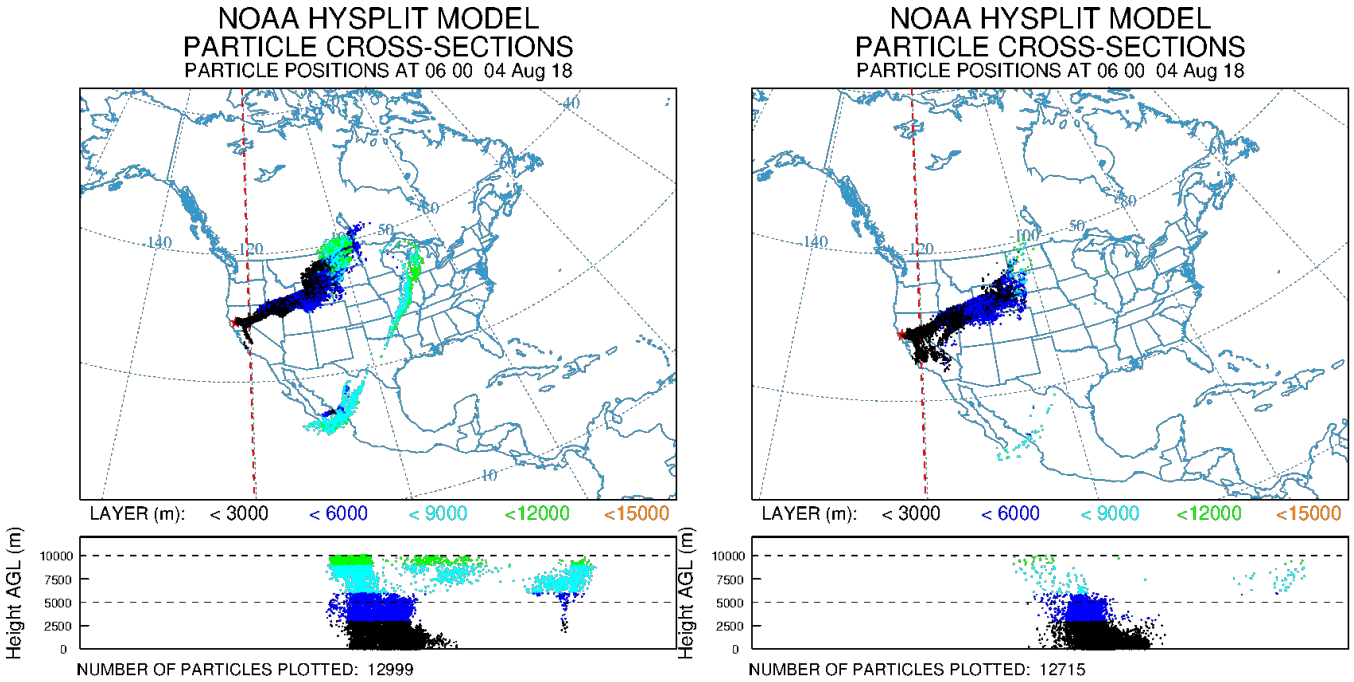


Figure 3-10b: August 3, 2018 HYSPLIT back trajectories (starting 8/4/18 00PST) with active fire locations and MODIS Aqua satellite image.



Of further greater impact was smoke from the Mendocino Complex, which pooled in the Sacramento Valley during August 1 and into August 2. Beginning on the evening of August 2, the smoke was also transported southward along the eastern portions of the Coastal Range and western San Joaquin Valley, reaching the Red Hills site late evening August 3. This impact is supported by dispersion modelling shown in Figure 3-11.

Figure 3-11: HYSPLIT forward particle dispersion results from Ranch Fire (left) and River Fire (right) (Mendocino Complex) – Model start time (8/2/18 00UTC, 8/1/18 16PST), results were one hour prior to the start exceeding 8-hour time period (8/4/18 06UTC, 8/3/18 22PST)



B. August 4, 2018

The fires at the Oregon border and Mendocino Complex continued impacting the monitor at Red Hills throughout the day of August 4 (Table 3-3). The backward trajectory from the time of maximum concentrations at 17PST (01UTC) showed influence from the coastal area, although the trajectory veered over and east of the Southern Coast Mountain Ranges and through an increasingly smoky San Joaquin Valley before impacting the monitor (Figures 3-12a and 3-12b).

A weak 500mb trough moved through the Pacific Northwest while high pressure across the desert southwest weakened, allowing for slightly cooler temperatures across the region (Appendix III). Strong northerlies associated with high pressure over the eastern Pacific Ocean persisted along the coast and continued to transport smoke from the Oregon wildfires southward. During the evening of August 4, strong onshore flow cleared smoky conditions to the southeast and east, allowing for cleaner air to reach the Red Hills site on August 5.

Table 3-3: Major wildfires impacting monitor on August 4, 2018

Fire	Start	Containment	Total Acres	Aug 4 Acres
Natchez	7/15/18	1/4/19	38,134	615
Klondike	7/16/18	11/28/18	175,528	2,605
Taylor Creek	7/16/18	10/11/18	52,389	1,994

Fire	Start	Containment	Total Acres	Aug 4 Acres
Mendocino Complex (Ranch)	7/27/18	9/19/18	410,203	50,752
Mendocino Complex (River)	7/27/18	8/10/18	48,920	1,699

Figure 3-12a: August 4, 2018 HYSPLIT back trajectory (starting 8/4/18 17PST) with active fire locations and NOAA HMS smoke plumes

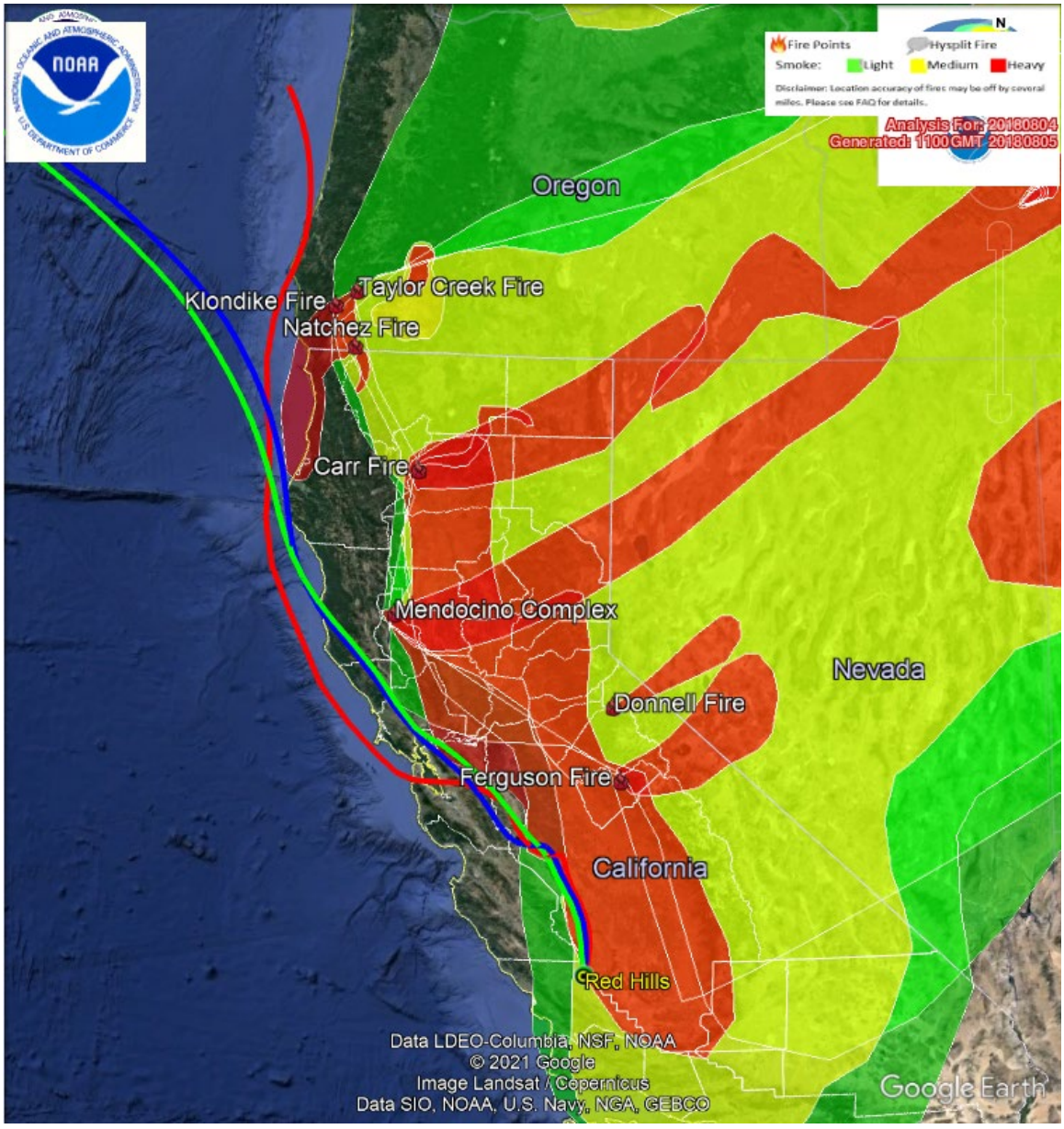
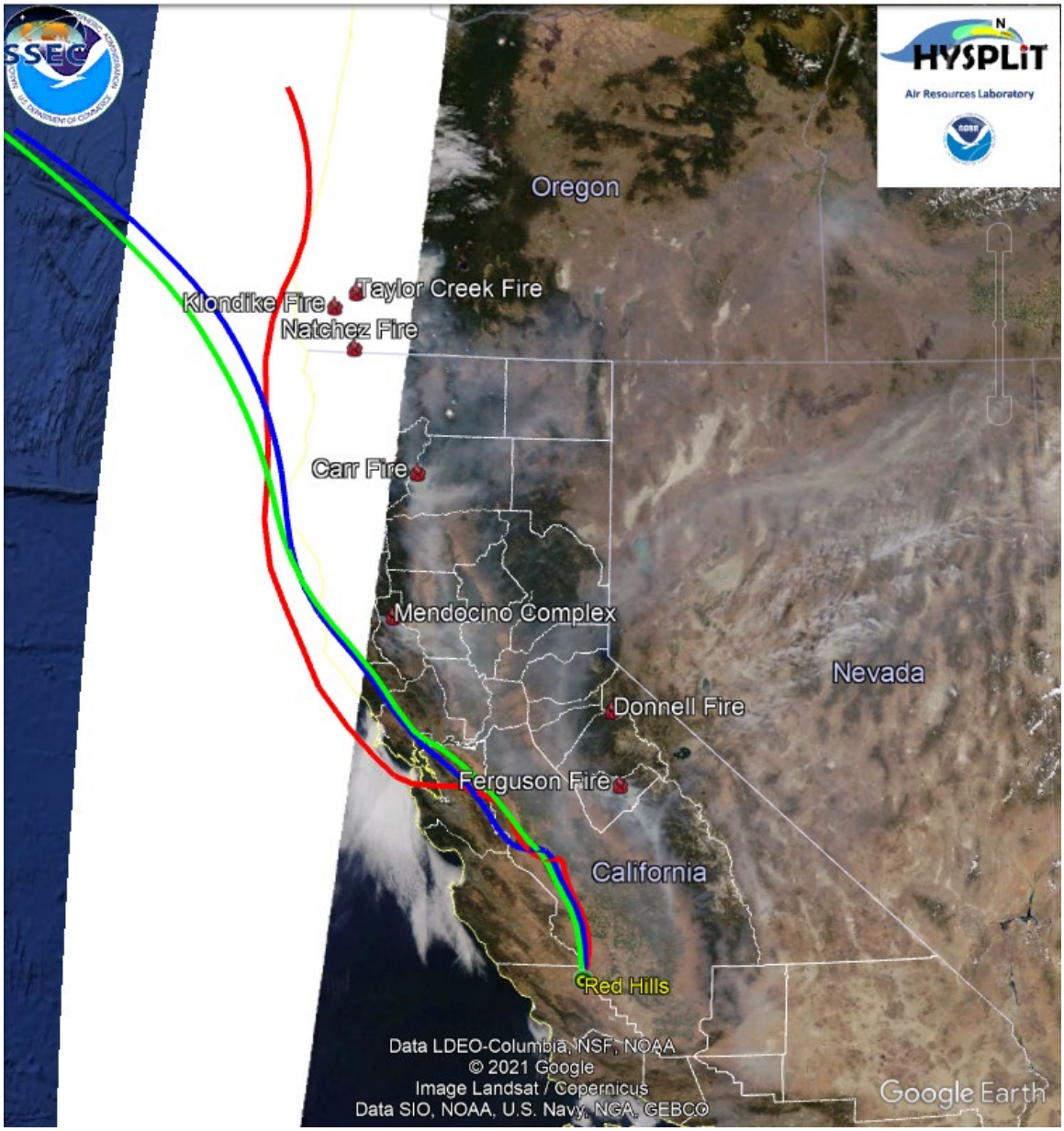
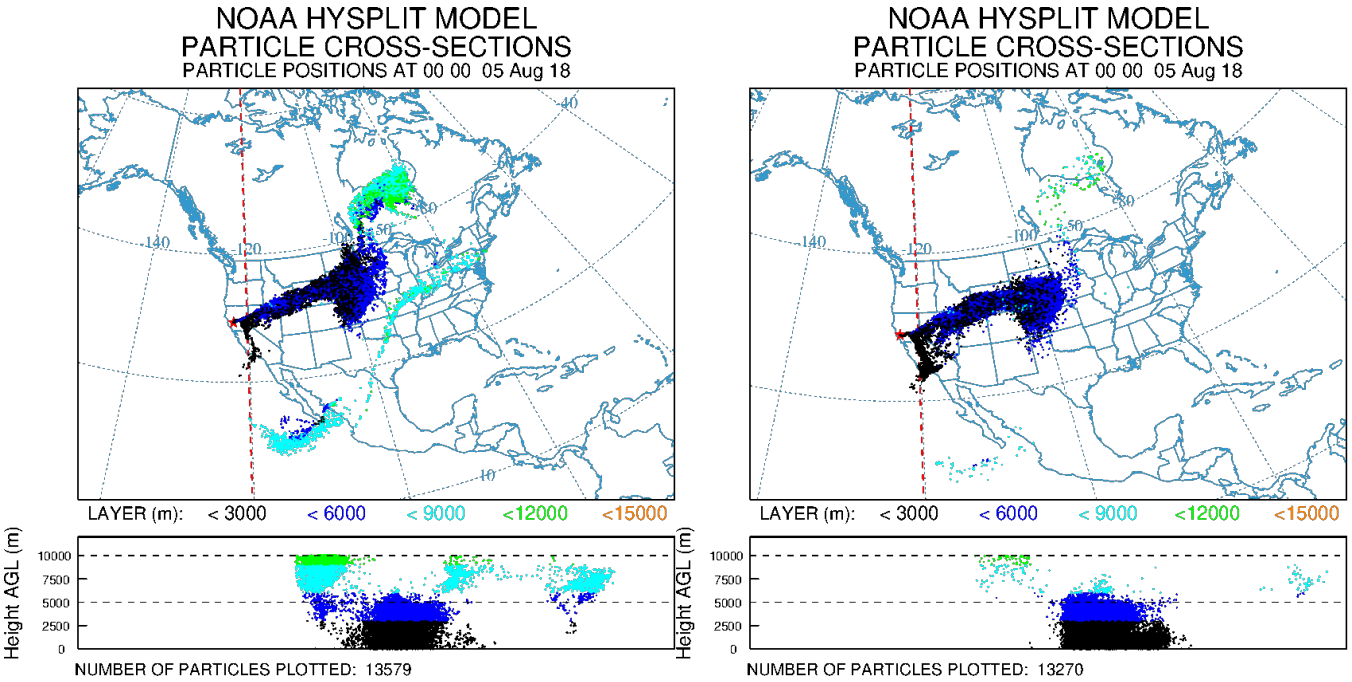


Figure 3-12b: August 4, 2018 HYSPLIT back trajectory (starting 8/4/18 17PST) with active fire locations and MODIS Terra satellite image



The forward dispersion models from the Mendocino Complex fires (Figure 3-13) continued to indicate smoke along the Southern Coastal Range and Western San Joaquin valley intersecting the trajectories that eventually reached the monitor.

Figure 3-13: HYSPLIT forward particle dispersion results from Ranch Fire (left) and River Fire (right) (Mendocino Complex) - one hour prior to peak concentration at Red Hills (which was at 8/5/18 01UTC, 8/4/18 17PST)



C. August 6, 2018

Upper level high pressure persisted across the desert southwest while a cutoff low sat in the Gulf of Alaska, providing for dry zonal flow at the 500 mb level across the region. The onshore flow during August 5 weakened, allowing low level winds to shift to more northwest and northerly (Appendix III).

Adding to the impacts from the wildfires to the north and east, a new wildfire, the Turkey Fire, began at 05PST (13UTC) on August 6, only 15 miles north of the Red Hills site (Table 3-4).

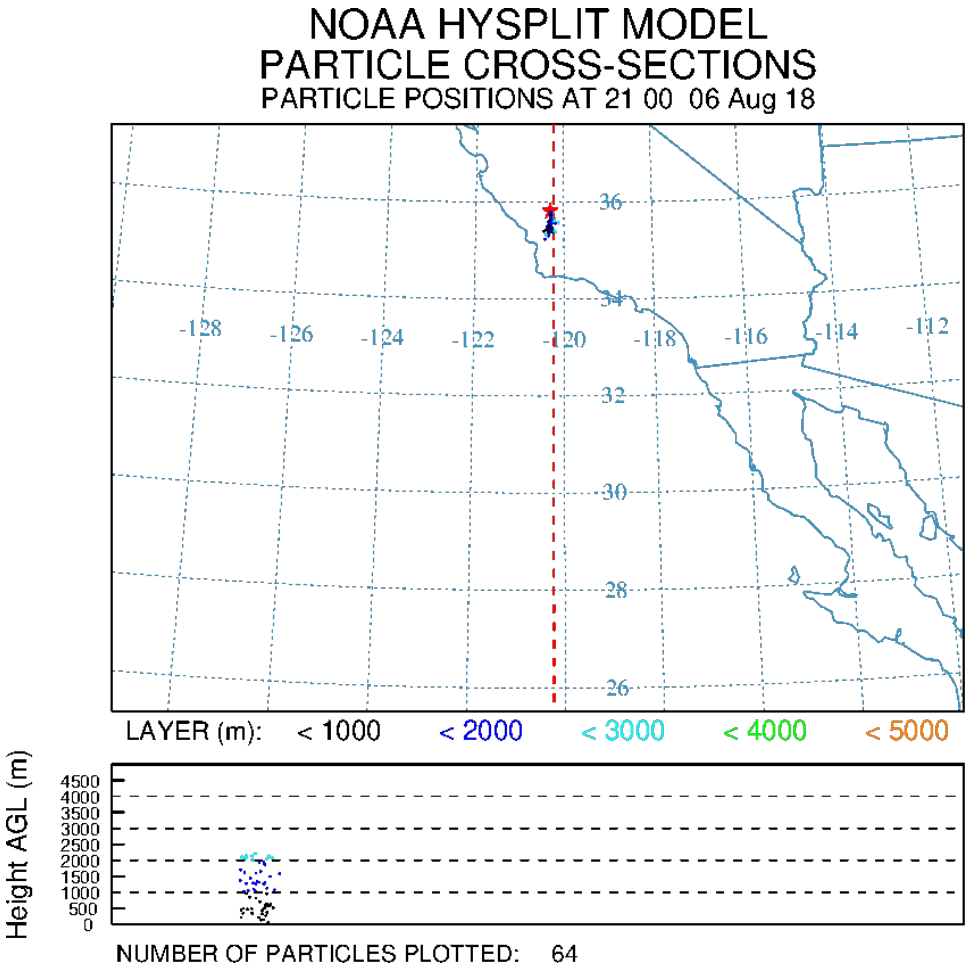
Table 3-4: Major wildfires impacting monitor on August 6, 2018

Fire	Start	Containment	Total Acres	Aug. 6 Acres
Ferguson	7/13/18	11/28/18	96,901	812
Natchez	7/15/18	1/4/19	38,134	88
Klondike	7/16/18	11/28/18	175,528	3,439
Taylor Creek	7/16/18	10/11/18	52,389	1,299
Carr	7/23/18	8/30/18	229,651	4,642
Mendocino Complex (Ranch)	7/27/18	9/19/18	410,203	16,677
Mendocino Complex (River)	7/27/18	8/10/18	48,920	746
Turkey	8/6/18	8/7/18	2,225	2,225

Northerly winds transported smoke and ozone precursors southward as indicated in Figure 3-14, which provides a closer view of the area. Ample sunlight amid the presence of smoke and

precursors all contributed to local ozone production, with elevated ozone concentrations impacting the Red Hills monitoring site during the day.

Figure 3-14: HYSPLIT forward dispersion results from Turkey Fire in southern California – Start time (8/6/18 18UTC, 10PST) showing midday dispersion toward Red Hills (at 8/6/18 21UTC, 13PST)



Additional major impacts were from the Mendocino Complex in Mendocino County, made up of both the Ranch and River Fires. A backward trajectory from the time of peak ozone concentration still showed impacts from the coastal area, but smoke along this transport path from southwestern Oregon did not reach the Red Hills area until late evening August 6 or early on August 7. Meanwhile, upper atmosphere back trajectories (blue and green lines) from the Red Hills monitor traced a path through the San Joaquin and Sacramento Valleys and the smoke plumes from the Mendocino Complex (Figures 3-15a and 3-15b).

Figure 3-15a: August 6, 2018 HYSPLIT back trajectory (starting 8/6/18 17PST) with active fire locations and NOAA HMS smoke plumes

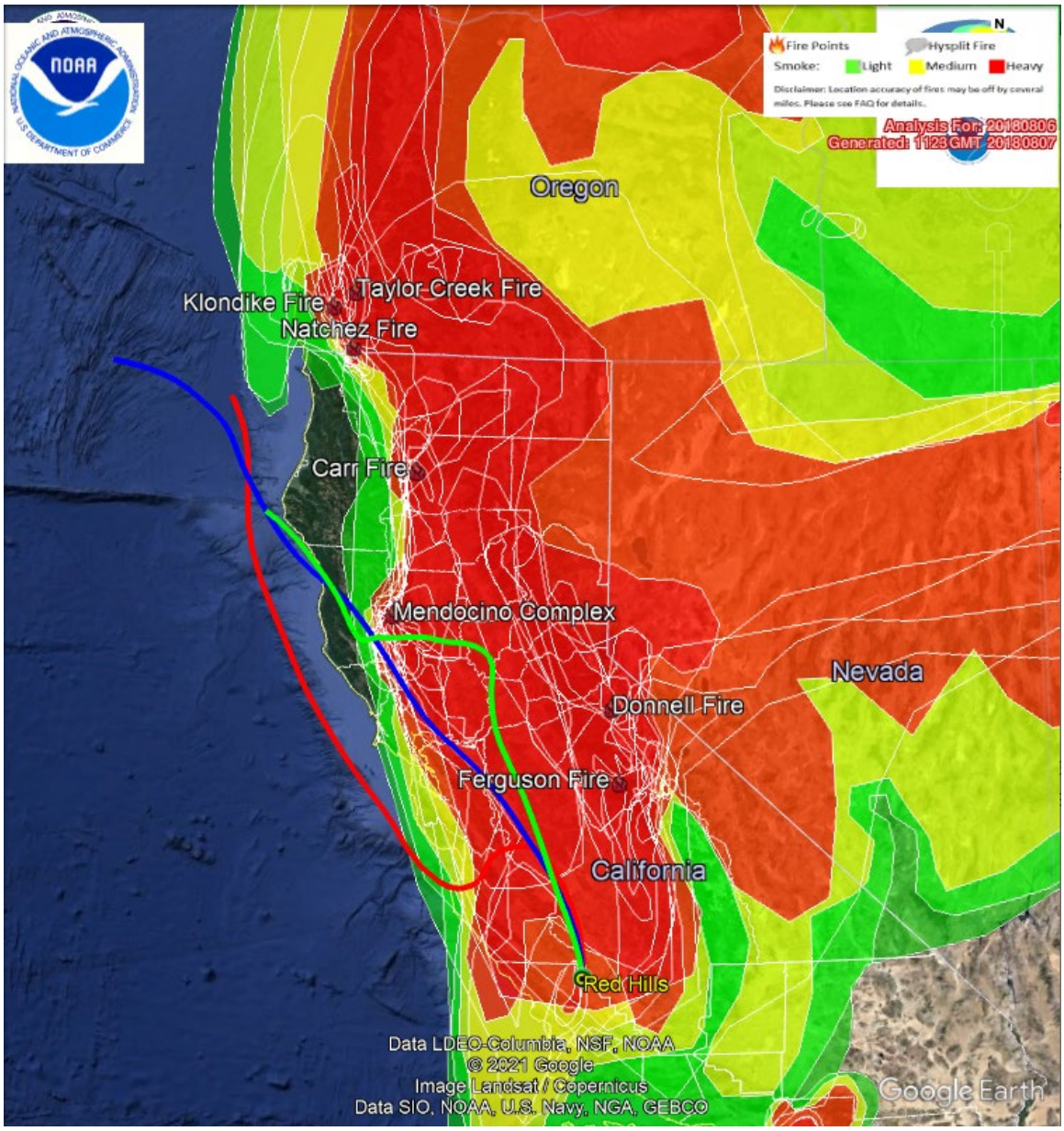
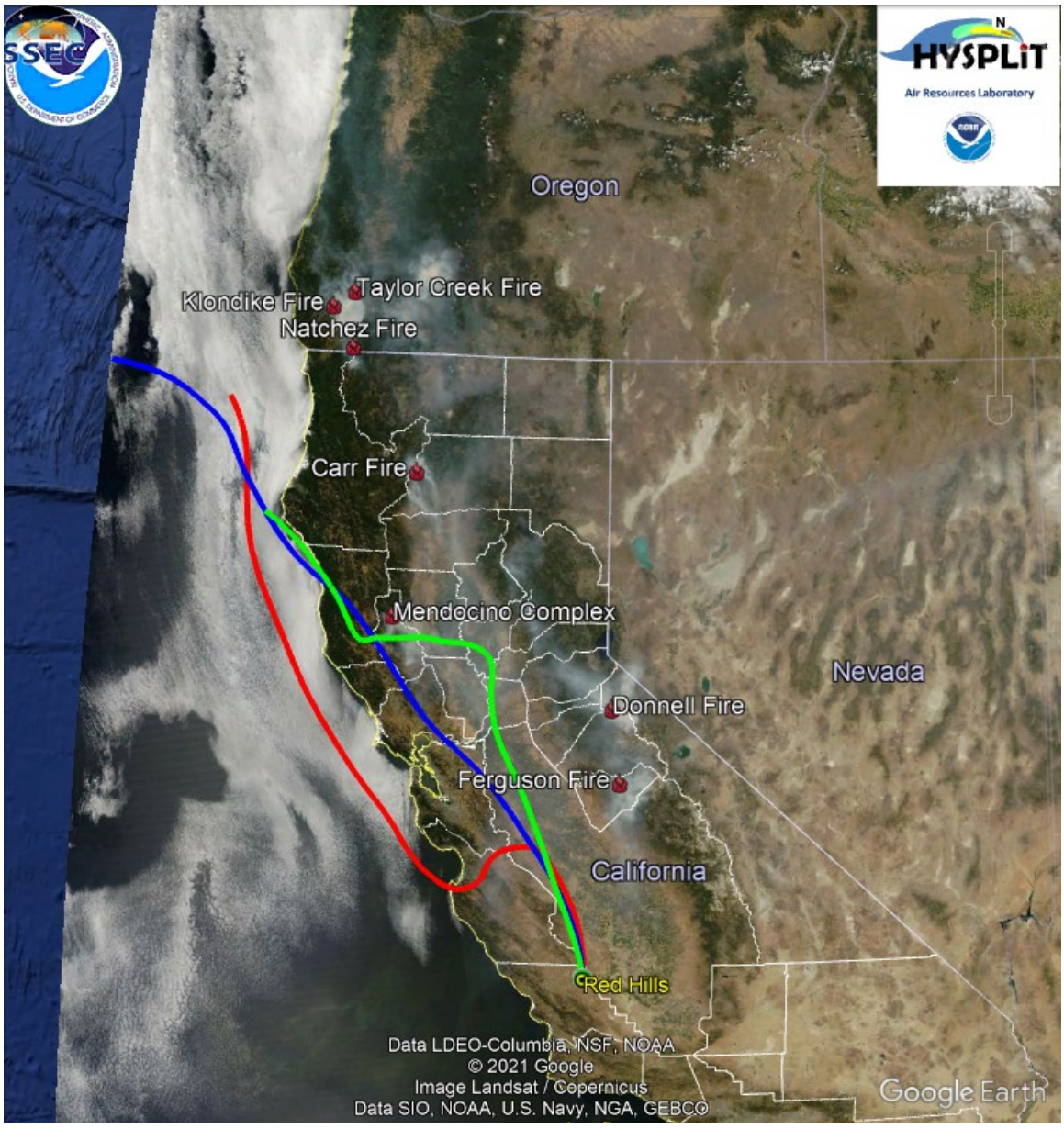
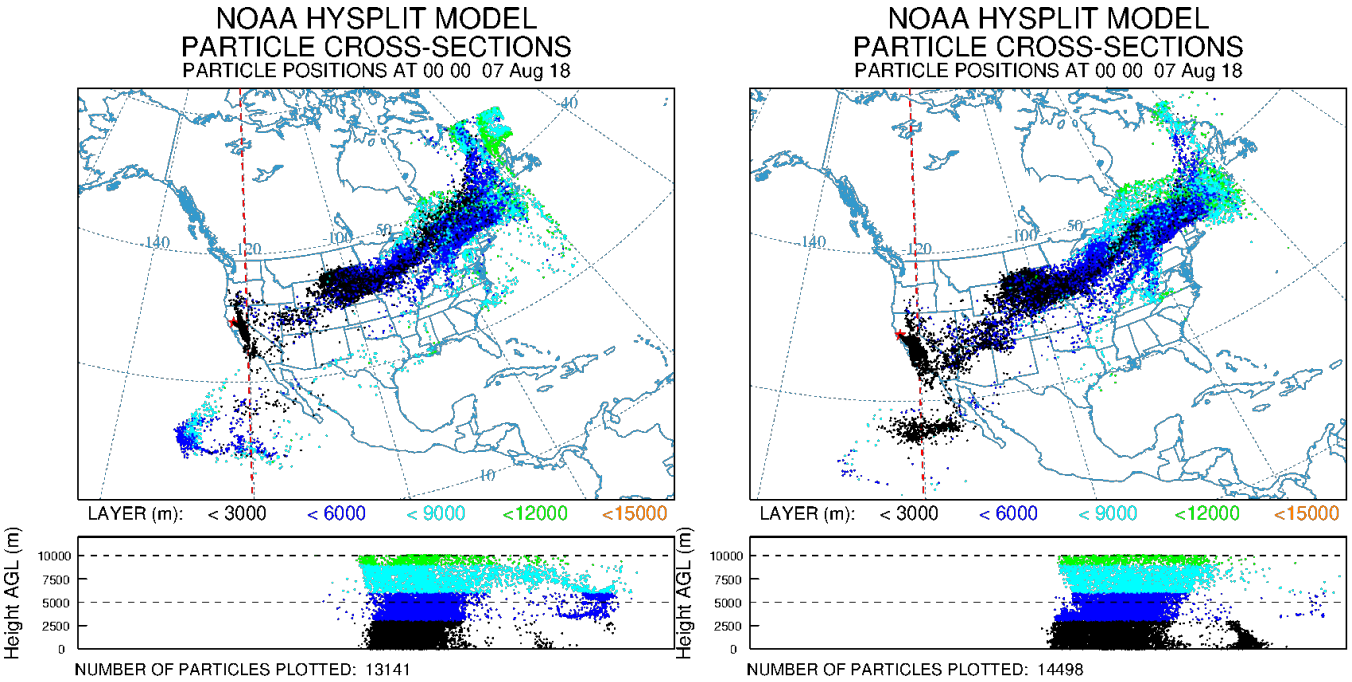


Figure 3-15b: August 6, 2018 HYSPLIT back trajectory (starting 8/6/18 17PST) with active fire locations and MODIS Aqua satellite image



A forward look from the Mendocino Complex (Figure 3-16) corroborated potential smoke intersecting the trajectory that eventually reached the monitor. Although a good amount of smoke moved east, thickening smoke in the central portion of California was evident in both the HMS smoke layers and the MODIS satellite images shown above.

Figure 3-16: HYSPLIT forward dispersion results from Ranch Fire (left) and River Fire (right) (Mendocino Complex) in northern California – one hour prior to peak concentration at Red Hills (8/7/18 01UTC, 8/6/18 17PST)



D. August 7, 2018

500mb high pressure began strengthening across the region while the center started shifting toward Nevada. Along with the continued dry conditions, this allowed temperatures to trend warmer while low level winds continued to flow generally from the north and northwest (Appendix III).

Emissions from wildfires at the Oregon border continued to impact the Red Hills monitor, but major impacts were from the Mendocino Complex and the Carr Fire to the north, and the Ferguson and Donnell Fires in the eastern foothills of the San Joaquin Valley (Table 3-5).

Table 3-5: Major wildfires impacting monitor on August 7, 2018

Fire	Start	Containment	Total Acres	Aug 7 Acres
Ferguson	7/13/18	11/28/18	96,901	322
Natchez	7/15/18	1/4/19	38,134	706
Klondike	7/16/18	11/28/18	175,528	1,934
Taylor Creek	7/16/18	10/11/18	52,389	875
Carr	7/23/18	8/30/18	229,651	4,011
Mendocino Complex (Ranch)	7/27/18	9/19/18	410,203	8,509
Mendocino Complex (River)	7/27/18	8/10/18	48,920	746
Donnell	8/1/18	1/4/19	36,450	3,291

The backward trajectory from the peak concentration at 14PST (22UTC) still showed impacts from the coastal area at the surface, but the upper atmosphere trajectories (green and blue), where most long-range transport would be, are again through the San Joaquin and Sacramento Valleys and through the cumulative smoke emitted from the large northern fires as well as the smoke drainage from the Ferguson and Donnell Fires (Figures 3-17a and 3-17b).

Figure 3-17a: August 7, 2018 HYSPLIT back trajectory (starting 8/7/18 14PST) with active fire locations and NOAA HMS smoke plumes

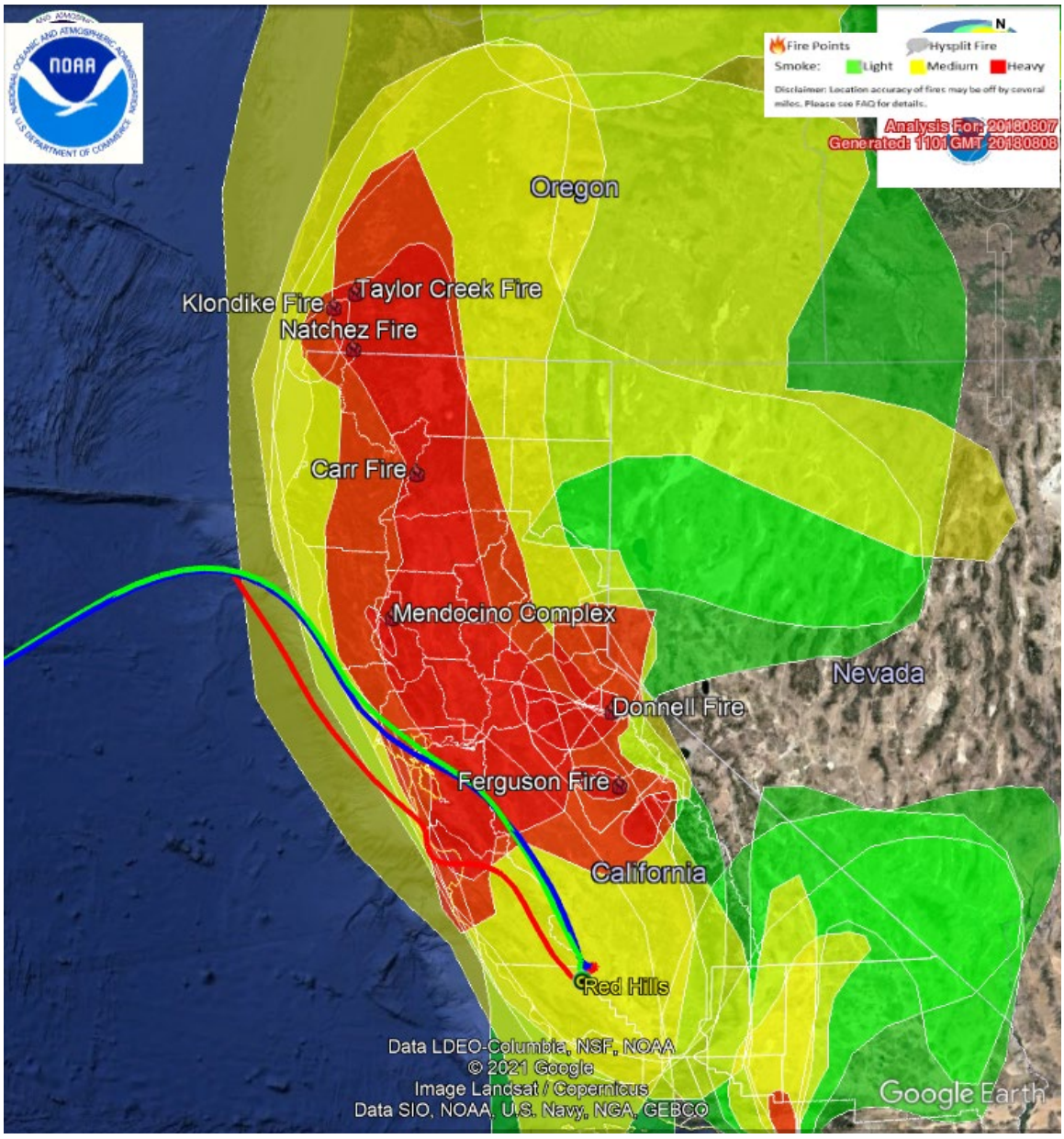
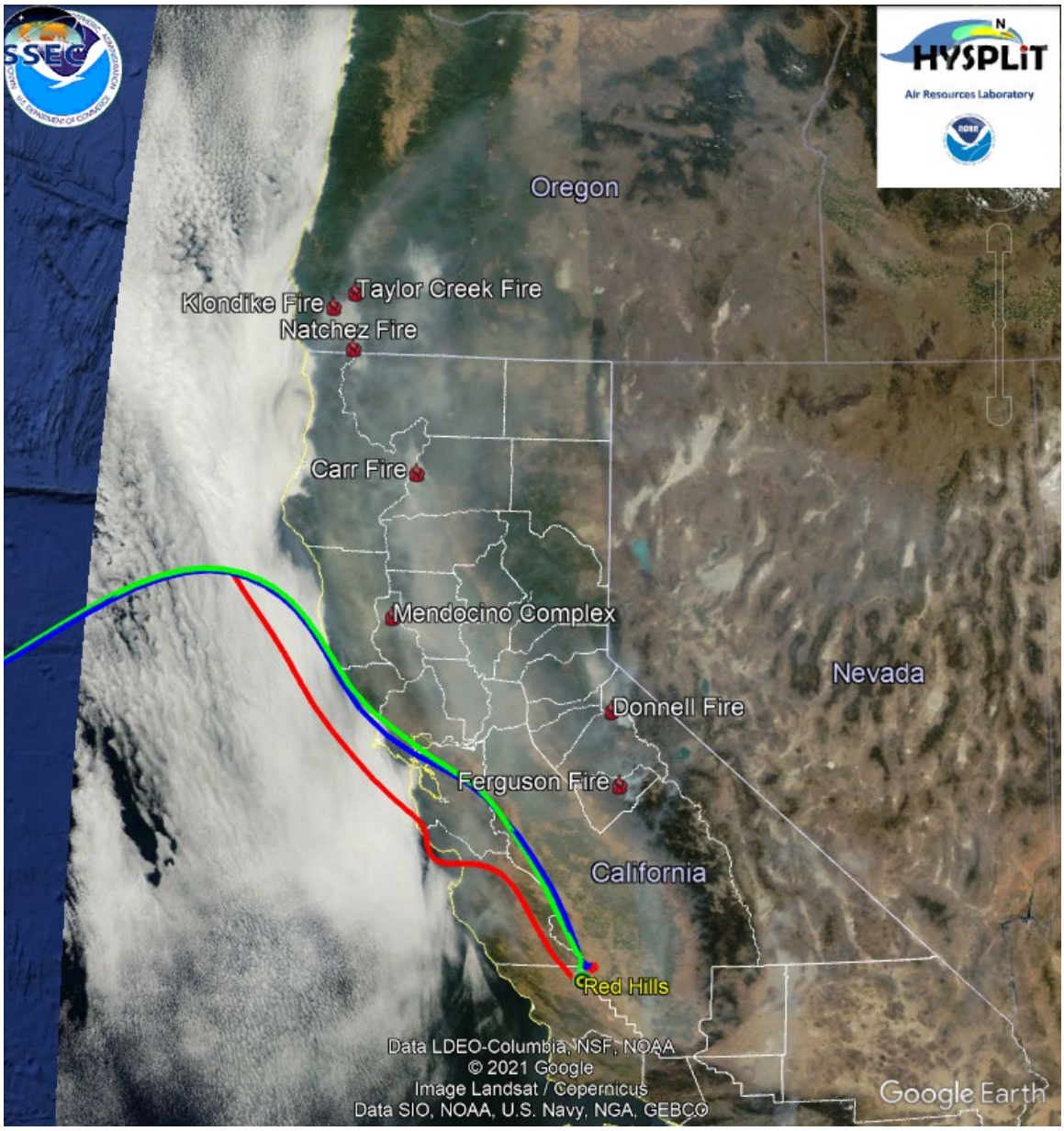
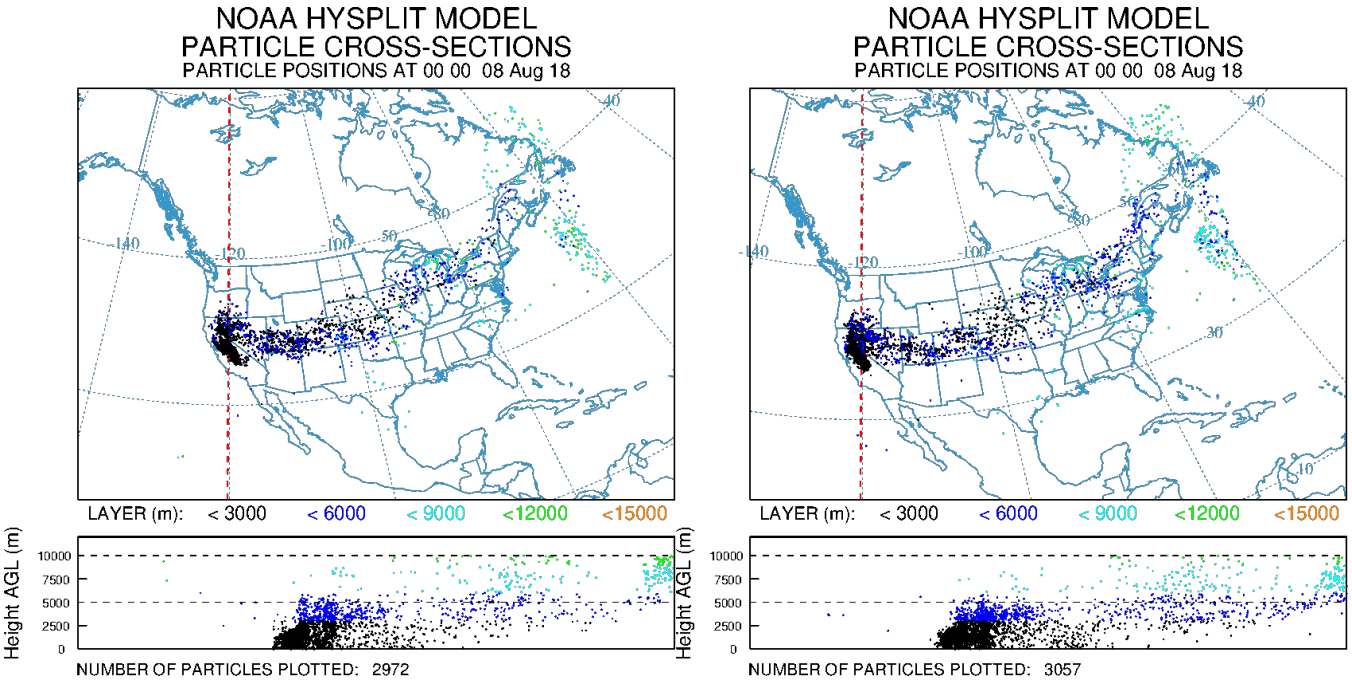


Figure 3-17b: August 7, 2018 HYSPLIT back trajectory (starting 8/7/18 14PST) with active fire locations and MODIS Aqua satellite image



A forward look from the Ferguson and Donnell Fires (Figure 3-18) corroborates potential for smoke intersecting the backward trajectory from the monitor. The thickening smoke in the central portion of California is evident in Figure 3-17b.

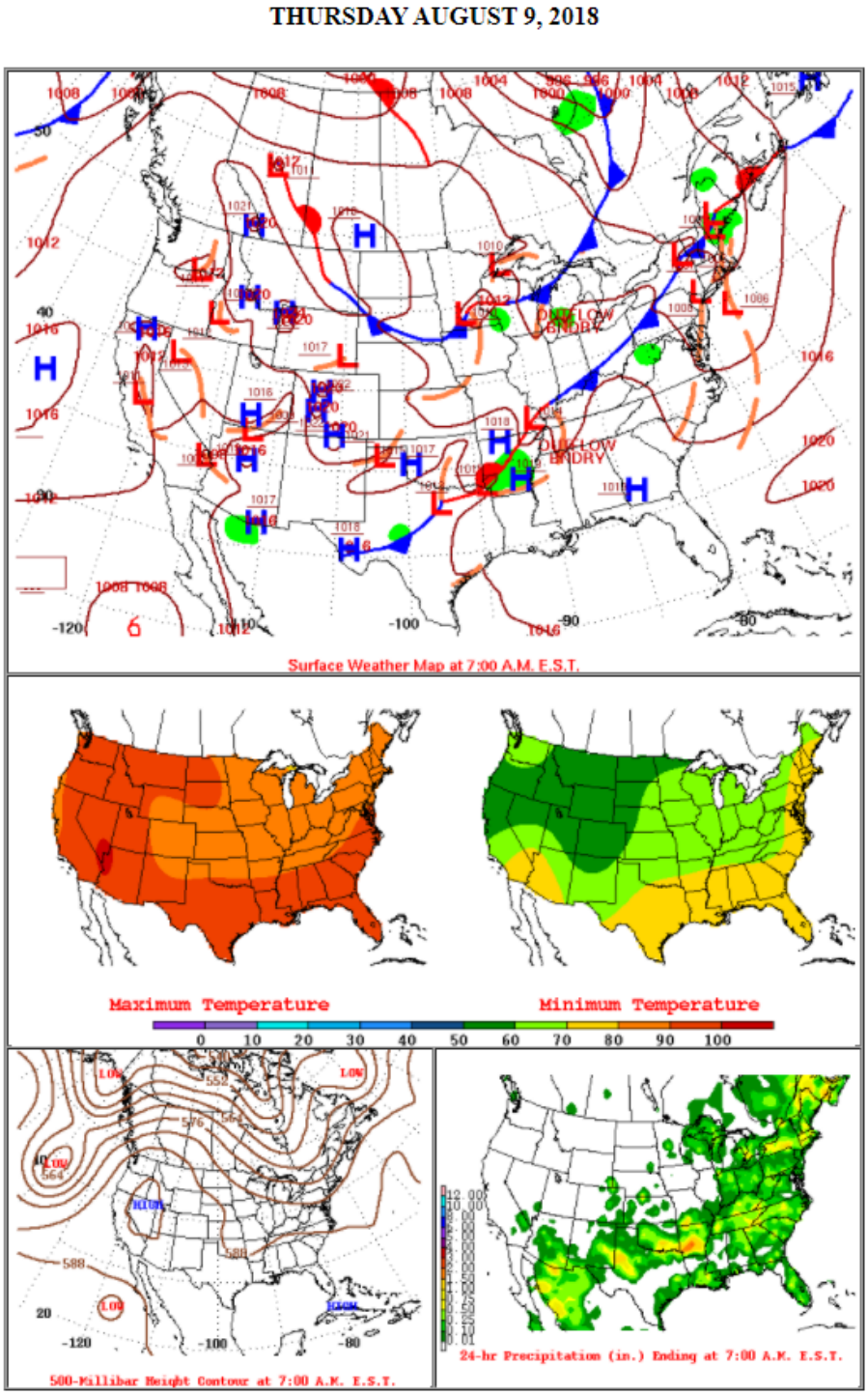
Figure 3-18: HYSPLIT forward dispersion results from Ferguson and Donnell Fires in eastern San Joaquin Valley – two hours after peak concentration at Red Hills (which was at 8/7/18 22UTC, 14PST)



1. August 9, 2018

Strong high pressure aloft continued to prevail across the western United States, providing above normal temperatures and continued dry conditions for most of California (Figure 3-19, Appendix III). During the late evening of August 9 into early August 10, a strong coastal pressure gradient provided for onshore westerly flow that blew more smoke towards the east while transporting cleaner marine air across the southern Coastal Range and far western San Joaquin Valley.

Figure 3-19: Meteorological conditions on August 9, 2018[27]



[27] NWS, *Daily Weather Maps*, last accessed 7/29/21

Major fire impacts were again from the Mendocino Complex in Mendocino County, the Carr Fire in Shasta County, and the Ferguson and Donnell Fires in the eastern foothills of the San Joaquin Valley (Table 3-6).

Table 3-6: Major wildfires impacting monitor on August 9, 2018

Fire	Start	Containment	Acres	Aug 9 Acres
Ferguson	7/13/18	11/28/18	96,901	227
Natchez	7/15/18	1/4/19	38,134	201
Klondike	7/16/18	11/28/18	175,528	3813
Taylor Creek	7/16/18	10/11/18	52,389	392
Carr	7/23/18	8/30/18	229,651	4386
Mendocino Complex (Ranch)	7/27/18	9/19/18	410,203	4503
Mendocino Complex (River)	7/27/18	8/10/18	48,920	Not Found
Donnell	8/1/18	1/4/19	36,450	2693

The backward trajectory from the peak concentration at 10PST (18UTC) showed impacts from the coastal area at the surface and upper levels, but the mid-level atmosphere trajectory (blue: 500 meters) trailed through the San Joaquin Valley before reaching the monitor at Red Hills. The trajectory tracked through the cumulative smoke emitted from the large northern fires and transported to the south, with additional impacts from the Ferguson and Donnell Fires (Figure 3-20a and III-20b).

Figure 3-20a: August 9, 2018 HYSPLIT back trajectory (starting 8/9/18 10PST) with active fire locations and NOAA HMS smoke plumes

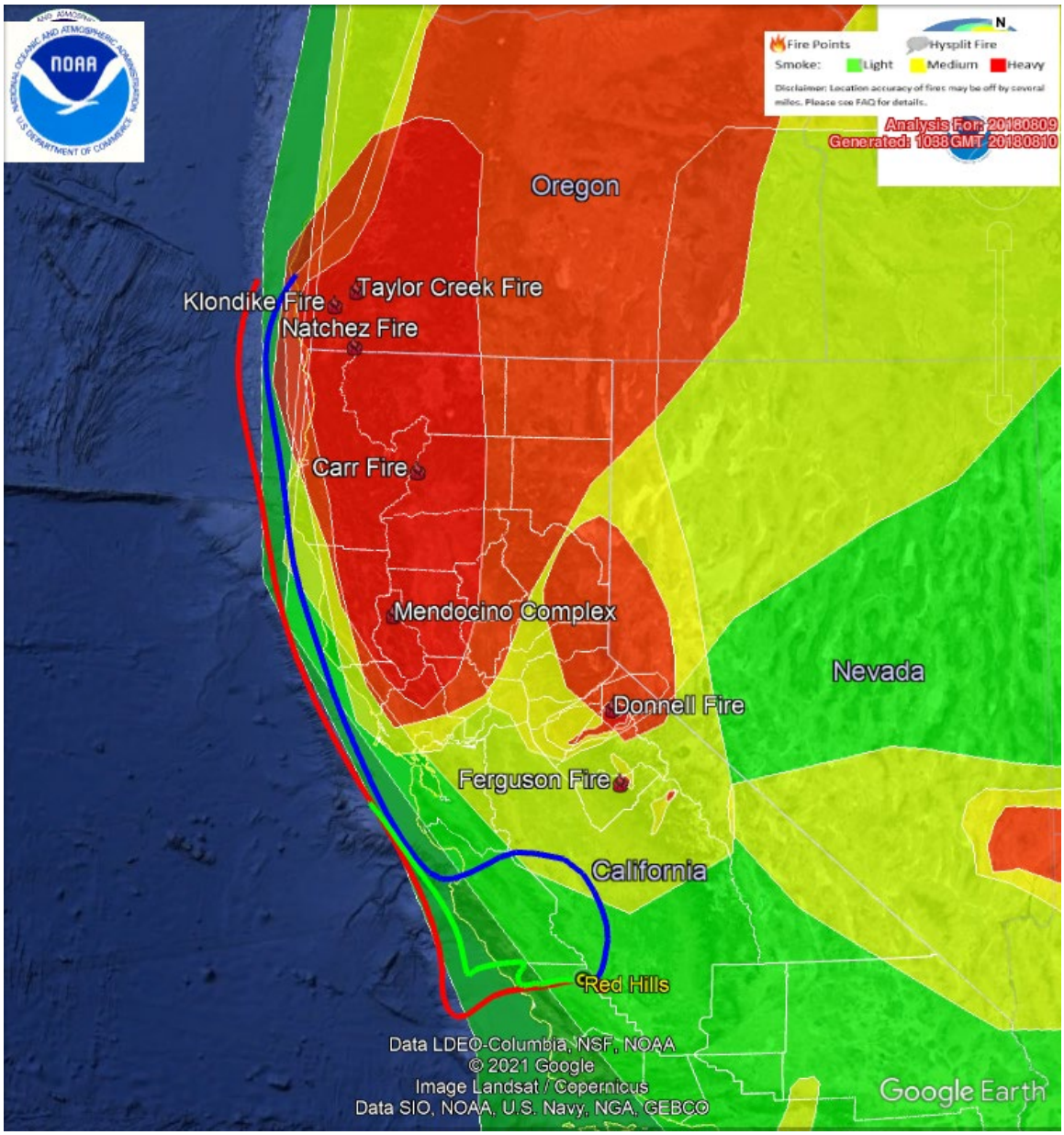
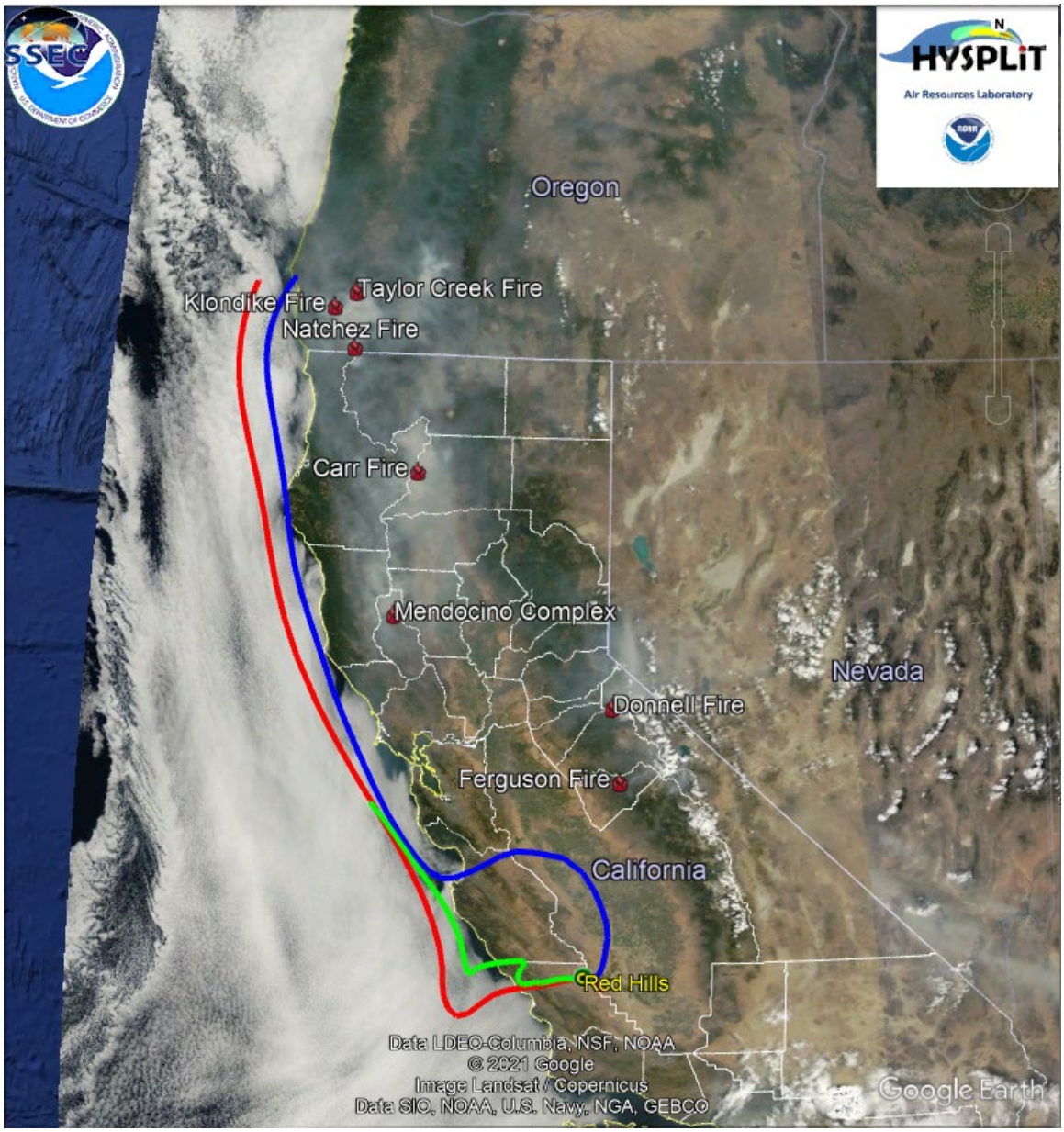


Figure 3-20b: August 9, 2018 HYSPLIT back trajectory (starting 8/9/18 10PST) with active fire locations and MODIS Aqua satellite image



A forward look from all these fires (Figure 3-21a, III-21b, and III-21c) corroborates potential for smoke intersecting the backward trajectory from the monitor. The thick smoke in the central portion of California is evident in Figure 3-20b.

Figure 3-21a: HYSPLIT forward dispersion results from Carr Fire in northern California – at time of peak concentration at Red Hills (8/9/18 18UTC, 10PST)

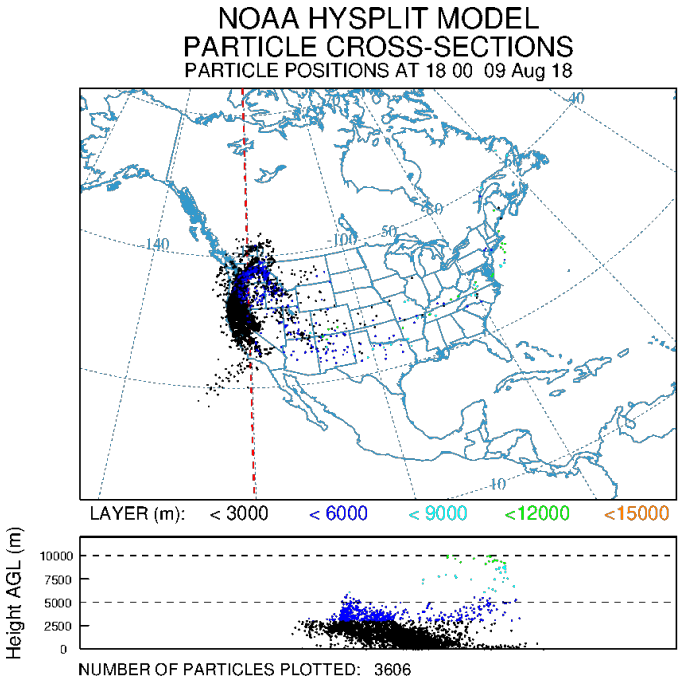


Figure 3-21b: HYSPLIT forward dispersion results from Ranch Fire and River Fire (Mendocino Complex) in northern California – at time of peak concentration at Red Hills (8/9/18 18UTC, 10PST)

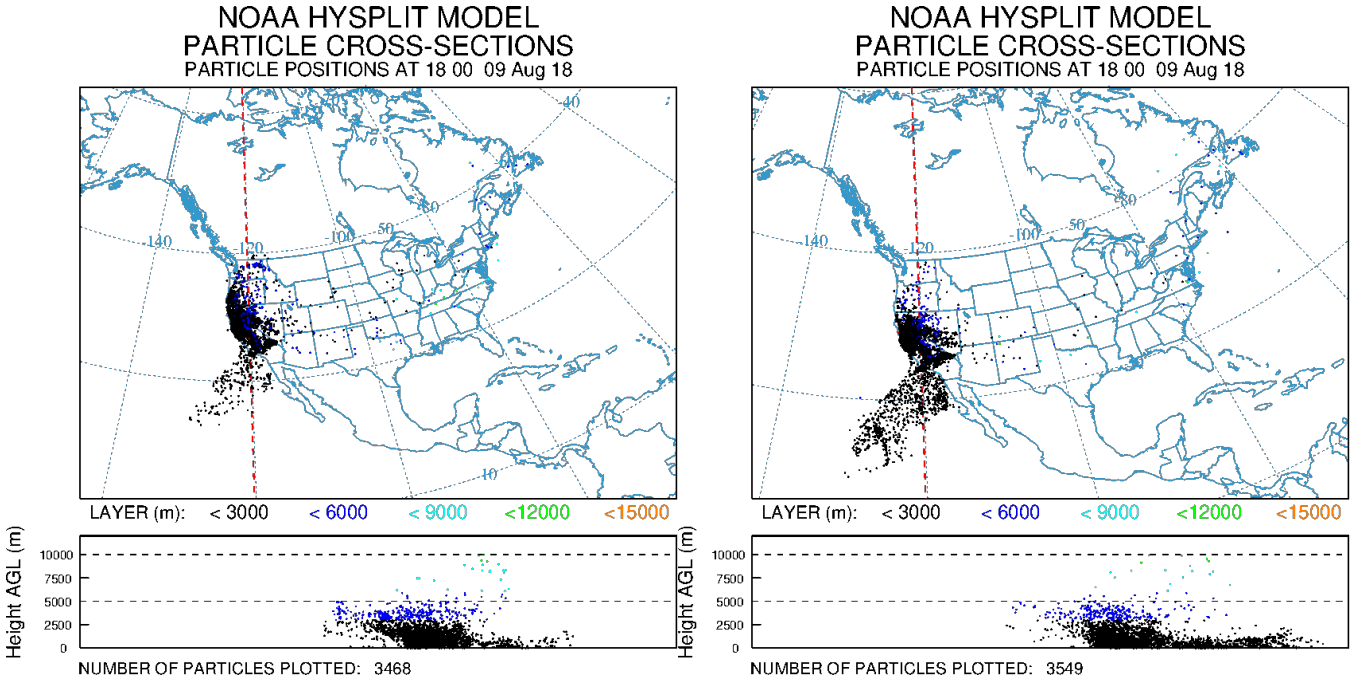
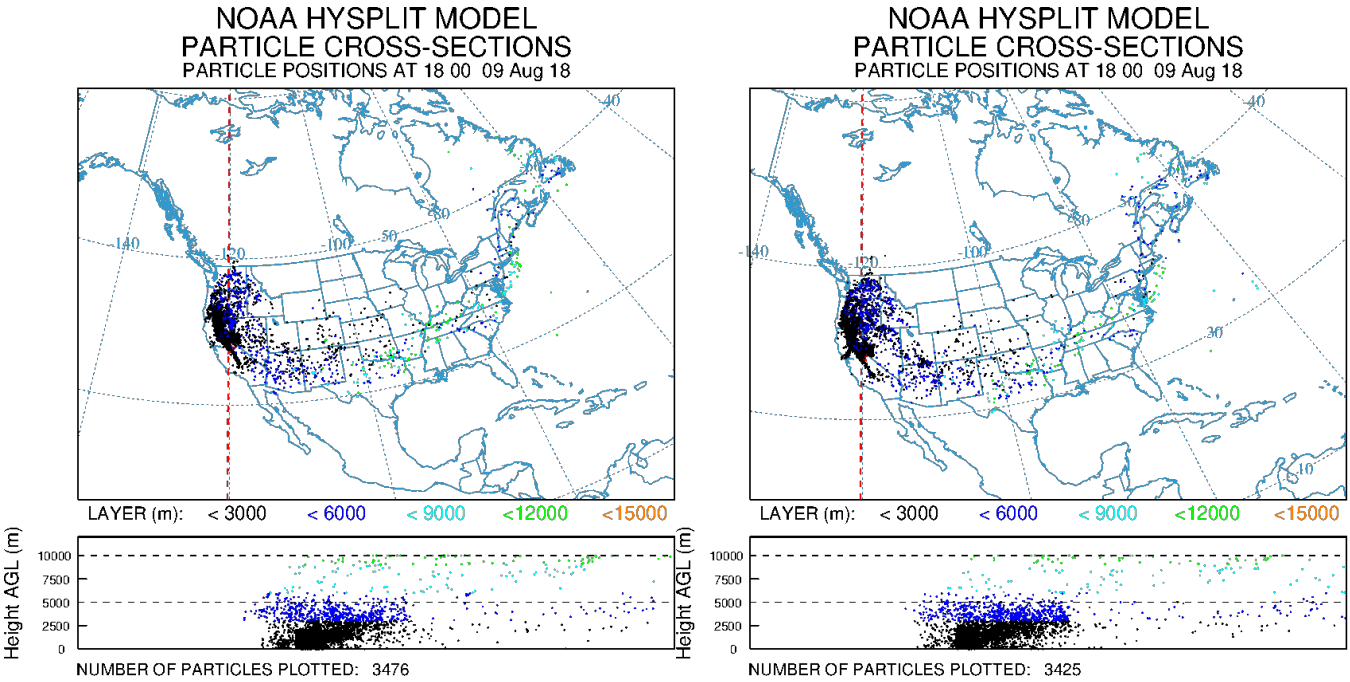


Figure 3-21c: HYSPLIT forward dispersion results from Ferguson Fire and Donnell Fire in central California – at time of peak concentration at Red Hills (8/9/18 18UTC, 10PST)



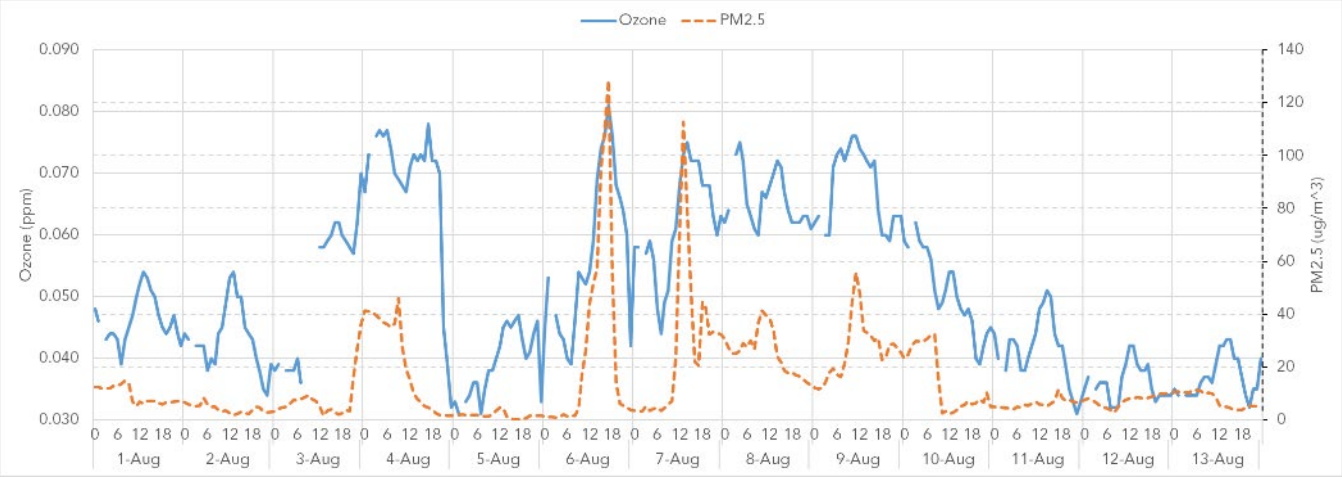
III. Event Related Concentrations and Long Term Trends

From August 3 through August 9, 2018, five exceedances of the 2015 8-hour Ozone NAAQS occurred at the Red Hills monitoring site in the Eastern Portion of San Luis Obispo County ozone nonattainment area. Specific wildfires impacted the site depending on the day, but generally northerly winds transported wildfire smoke and ozone precursors from the Mendocino Complex, Natchez, Carr, Donnell, Ferguson, and Turkey wildfires causing elevated ozone concentrations at the monitor. Additionally, smoke from the Taylor Creek and Klondike fires in Oregon was transported to the area, adding an additional smoke layer, and likely contributed to higher than normal ozone concentrations on several days. Elevated $PM_{2.5}$ sensor concentrations and associated timing support the presence of wildfire smoke at the site.

Figure 3-22 shows ozone and sensor $PM_{2.5}$ concentrations at the Red Hills site from two days prior through four days after the August 3 through August 9 exceedance event. The timing of relative $PM_{2.5}$ increases along with the elevated concentrations show strong connections with ozone increases and the prolonged elevated ozone concentrations. At the start of the event, $PM_{2.5}$ and ozone concentrations rapidly rose more than 10-fold late in the day on August 3, with the majority of ozone concentrations that contributed to the August 3 exceedance occurring during the overnight hours into early August 4, an abnormal pattern for the site. In the early evening of August 6 (17PST), both $PM_{2.5}$ and ozone registered the highest values in the August 1 to August 13 timeframe. After falling overnight, $PM_{2.5}$ values rose 15-fold over three hours on August 7, with ozone concentrations peaking immediately after. Overall, ozone concentrations were greater than 0.050 ppm for all hours where the

$PM_{2.5}$ sensor values were greater than 20 µg/m^3, regardless of time of day. This consistent relationship between high $PM_{2.5}$ and elevated ozone values is supportive of a strong influence by wildfire smoke.

Figure 3-22: 1-hour Ozone and 1-hour $PM_{2.5}$ Concentrations at Red Hills



Recent trends show a gradual decrease in both design values and annual 4th highs for 8-hour average ozone at the Red Hills monitoring site as shown in Figures 3-23 and Figure 3-24. The 2018 design value, which would have been below the standard if the trend continued, remained above the 8-hour standard. Although concurrence of the requested exceptional event dates in 2018 would not bring the site design value below the standard alone, combined with concurrence of events in 2020 (separate documentation), the area will be in attainment of the 2015 standard, as originally anticipated with the historical trend line.

Figure 3-23: 8-hour Ozone Design Values with Trend at Red Hills

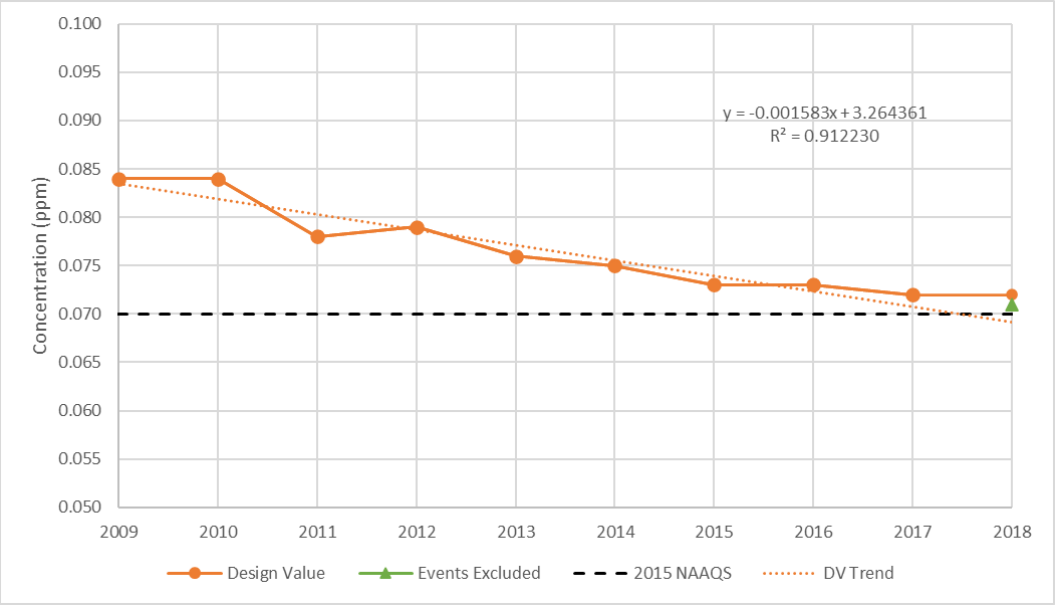
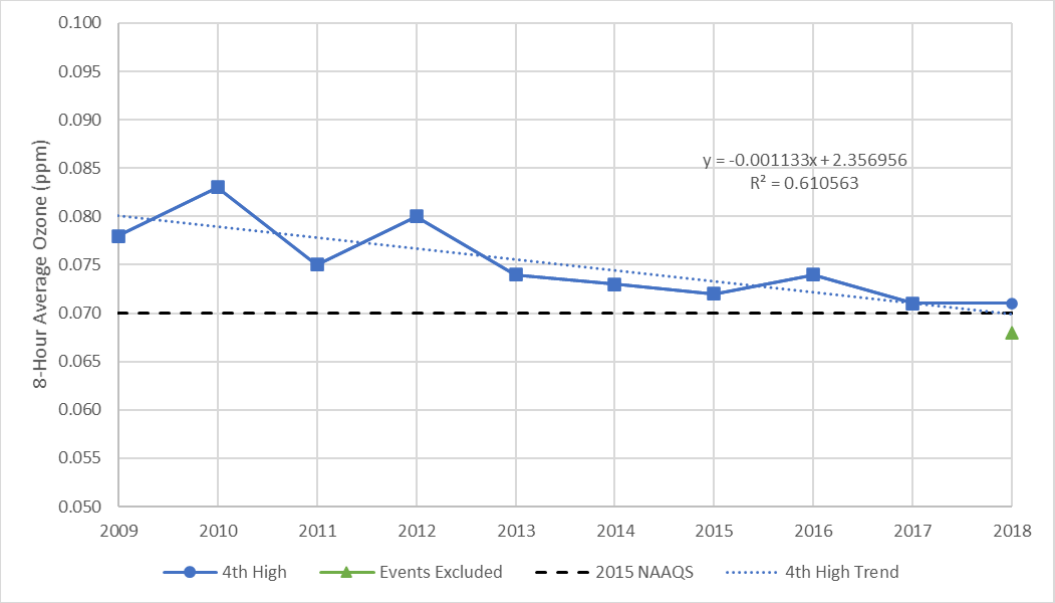


Figure 3-24: Annual 4th High 8-Hour Average Ozone with Trend at Red Hills



IV. Meteorological Conditions

Maximum daily temperatures were in or near the low 90s throughout the event but did show a slight cooling period from August 5 through August 6 when temperatures only reached the upper 80s. Maximum daily wind speeds generally remained in the 16-21 miles per hour (mph) range, with the exceptions of August 3 and August 9 with slightly lower wind speeds of 13-15 mph. Winds on August 10 peaked at 27 mph.

Table 3-7: Maximum Daily Values of Temperature and Wind Speed on Exceptional Event and Surrounding Days at Red Hills Monitoring Site

Date	8/1	8/2	8/3*	8/4*	8/5	8/6*	8/7*	8/8	8/9*	8/10
1hr Ozone (ppm)	0.054	0.054	0.070	0.078	0.047	0.081	0.075	0.075	0.076	0.062
8hr Ozone (ppm)	0.050	0.048	0.073	0.072	0.044	0.071	0.071	0.068	0.073	0.051
Temperature (°F)	94.1	93.9	94.1	92.7	88.2	88.3	90.3	92.1	95.2	91.2
Wind Speed (mph)	18.6	20.8	14.7	19.8	18	19.2	19	16.7	13.9	27.3

* Denotes Exceptional Event Dates Requested for Data Exclusion

Overall, maximum temperature and wind speeds fluctuated only moderately between days in early August 2018, while maximum ozone concentrations varied significantly with a range of 0.034 ppm and 0.029 ppm for 1-hour and 8-hour ozone, respectively.

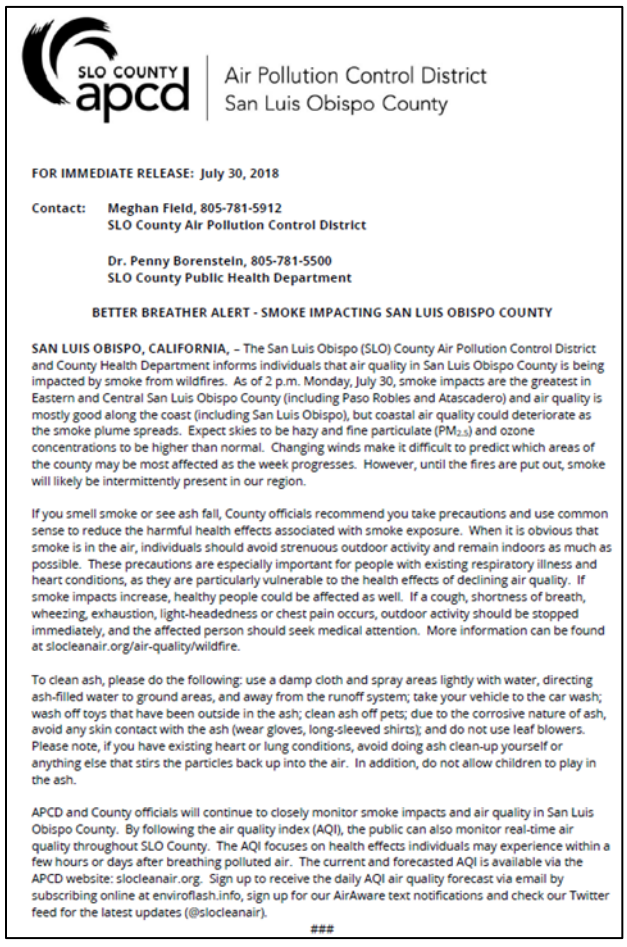
On August 3, the ozone concentrations that led to the daily exceedance did not even begin climbing until 22PST, well after sunset and when the temperature had fallen below 80°F. The lower temperature and lack of sunlight for photochemical production of ozone indicates that the increasing ozone concentrations in the late hours of August 3 and early morning of August 4 were the direct result of transport.

The weather data supports that ozone directly related to smoke from the wildfires in California and Oregon affected the Red Hills monitor and increased ozone concentrations through transport and atmospheric formation. Unusual weather (other than the transport of ozone and related wildfire smoke) was not a factor contributing to the exceptional event.

V. Air Quality/Health Advisories

The San Luis Obispo County APCD maintains a website with information on the impacts of wildfire smoke and how fires are affecting the county. Residents are encouraged to sign up for their AirAware-Mobile Alerts program. Health advisories were issued by the San Luis Obispo County APCD for San Luis Obispo County and distributed by the district through the district website,[28] county public health agency website,[29] National Weather Service Air Quality Alerts, and the district's Twitter feed. [30]

Figure 3-25. Example of San Luis Obispo County APCD Better Breather Alert



SLO COUNTY apcd | Air Pollution Control District San Luis Obispo County

FOR IMMEDIATE RELEASE: July 30, 2018

Contact: **Meghan Field, 805-781-5912**
SLO County Air Pollution Control District

Dr. Penny Borenstein, 805-781-5500
SLO County Public Health Department

BETTER BREATHER ALERT - SMOKE IMPACTING SAN LUIS OBISPO COUNTY

SAN LUIS OBISPO, CALIFORNIA, – The San Luis Obispo (SLO) County Air Pollution Control District and County Health Department informs individuals that air quality in San Luis Obispo County is being impacted by smoke from wildfires. As of 2 p.m. Monday, July 30, smoke impacts are the greatest in Eastern and Central San Luis Obispo County (including Paso Robles and Atascadero) and air quality is mostly good along the coast (including San Luis Obispo), but coastal air quality could deteriorate as the smoke plume spreads. Expect skies to be hazy and fine particulate ($PM_{2.5}$) and ozone concentrations to be higher than normal. Changing winds make it difficult to predict which areas of the county may be most affected as the week progresses. However, until the fires are put out, smoke will likely be intermittently present in our region.

If you smell smoke or see ash fall, County officials recommend you take precautions and use common sense to reduce the harmful health effects associated with smoke exposure. When it is obvious that smoke is in the air, individuals should avoid strenuous outdoor activity and remain indoors as much as possible. These precautions are especially important for people with existing respiratory illness and heart conditions, as they are particularly vulnerable to the health effects of declining air quality. If smoke impacts increase, healthy people could be affected as well. If a cough, shortness of breath, wheezing, exhaustion, light-headedness or chest pain occurs, outdoor activity should be stopped immediately, and the affected person should seek medical attention. More information can be found at slocleanair.org/air-quality/wildfire.

To clean ash, please do the following: use a damp cloth and spray areas lightly with water, directing ash-filled water to ground areas, and away from the runoff system; take your vehicle to the car wash; wash off toys that have been outside in the ash; clean ash off pets; due to the corrosive nature of ash, avoid any skin contact with the ash (wear gloves, long-sleeved shirts); and do not use leaf blowers. Please note, if you have existing heart or lung conditions, avoid doing ash clean-up yourself or anything else that stirs the particles back up into the air. In addition, do not allow children to play in the ash.

APCD and County officials will continue to closely monitor smoke impacts and air quality in San Luis Obispo County. By following the air quality index (AQI), the public can also monitor real-time air quality throughout SLO County. The AQI focuses on health effects individuals may experience within a few hours or days after breathing polluted air. The current and forecasted AQI is available via the APCD website: slocleanair.org. Sign up to receive the daily AQI air quality forecast via email by subscribing online at enviroflash.info, sign up for our AirAware text notifications and check our Twitter feed for the latest updates (@slocleanair).

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[28] *San Luis Obispo County APCD*, last accessed 7/29/21
[29] San Luis Obispo County, *Department of Public Health*, last accessed 7/29/21
[30] San Luis Obispo County APCD Twitter Feed, @SLOCleanAir, last accessed 7/29/21

Advisories for this prolonged event were first issued on Monday July 30, 2018 with a Better Breather Alert informing the public of the ongoing impact of wildfire smoke on much of the district, warning of the potential for elevated $PM_{2.5}$ and ozone concentrations, and that "until the fires are put out, smoke will likely be intermittently present in our (San Luis Obispo) region." An updated Alert was issued on Monday August 6. Additional alerts and advisories were sent out from August 6 through August 10, including updates pertaining to the nearby Turkey Fire which was ignited on August 6. Copies of these advisories are included in Appendix II.

VI. Media Coverage

The Red Hills area is sparsely populated, with the largest town located 25 miles to the west. Media coverage of the area is scarce, but there was some coverage, particularly of the air quality advisories released by the District (Appendix VI). The Turkey Fire, which ignited on August 6, 2018, was extensively covered, with the smoke impacts in eastern San Luis Obispo County of particular note (Figure 3-26).

Figure 3-26. Example of News Media Coverage[31]

THE TRIBUNE

ENVIRONMENT

Air quality alert: Smoke from California wildfires is impacting SLO County

BY LINDSEY HOLDEN
JULY 31, 2018 01:07 PM, UPDATED JULY 31, 2018 01:19 PM

Dramatic photos show destruction, flames blazing at the Carr Fire

Firefighters battle a flare-up near Buckhorn Summit on Hwy 299 during the Carr Fire in Trinity County on Monday, July 30, 2018, as families begin to return to burned areas in Redding.
BY PAUL KITAGAKI | KAYLA FITZGERALD

Listen to this article now
01:47 Powered by Trinity Audio

Air quality in San Luis Obispo County this week will be impacted by smoke from the wildfires burning throughout the state.

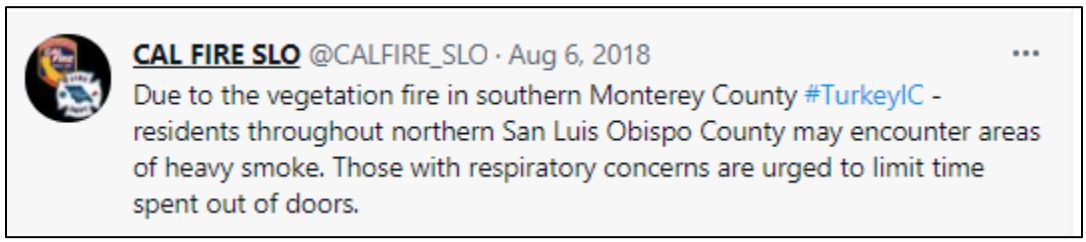
The San Luis Obispo County Air Pollution Control District (APCD) and the County Health Department issued an alert on Monday warning residents about a spreading smoke plume that's causing a decline in air quality, especially in Paso Robles, Atascadero and the Carrizo Plain area.

The smoke is coming from wildfires that have scorched hundreds of thousands of acres of land throughout Northern, Central and Southern California.

[31] San Luis Obispo Tribune, *Air quality alert: Smoke from California wildfires is impacting SLO County*, 7/31/18

Social media accounts of the Turkey Fire were also abundant (Figure 3-27 and Appendix VI). Government accounts, such as CalFire and San Luis Obispo County APCD, as well as local news media in Paso Robles, San Luis Obispo, and Monterey, kept the local community informed of smoke impacts and fire growth potential via both Twitter and Facebook.

Figure 3-27. Example of Social Media Coverage[32]



Clear Causal Relationship

This chapter addresses the "clear causal relationship" criterion per U.S. EPA's exceptional events guidance by providing 1) a comparison of the ozone data requested for exclusion with historical concentrations at the air quality monitor, 2) a demonstration that the wildfire's emissions were transported to the monitor, 3) a demonstration that the emissions from the wildfire influenced the monitored concentrations, and in some cases 4) a quantification of the contribution of the wildfire's emissions to the monitored ozone exceedance or violation.

For wildfire ozone events, U.S. EPA has defined a tiered approach that apply to the "clear causal relationship" criterion based on key factors and is intended to lessen the evidence required for more obvious and/or extreme events. These tiers require analyses to establish the existence of wildfire emissions, transport to the exceeding monitor, and impact at the monitor. Each tier is to be taken in order and are summarized below. Specific information that is presented to satisfy these criteria can be found in the individual tier sections.

- Tier 1: Exceedances are clearly higher than non-event related concentrations and have occurred from a fire in close proximity to the exceeding monitor during a time or place of historically low ozone concentrations;
- Tier 2: This tier is used when impacts do not qualify for Tier 1 analysis, but exceedances are higher than non-event related exceedances although may not be "clearly" higher, and large fire emissions relative to the distance of the fire to the monitor indicate a clear causal relationship;
- Tier 3: This tier encompasses wildfires or impacts that are more complex and do not qualify for Tier 1 or Tier 2 analysis, but additional analyses submitted as part of a weight-of-evidence showing can establish a clear causal relationship.

This demonstration meets the purpose of U.S. EPA's published guidance and provides the evidence needed to concur on all requested exceptional event dates in 2018.

[32] *CalFire SLO Twitter Post, 8/6/18*

I. Tier 1 Key Factor Analysis

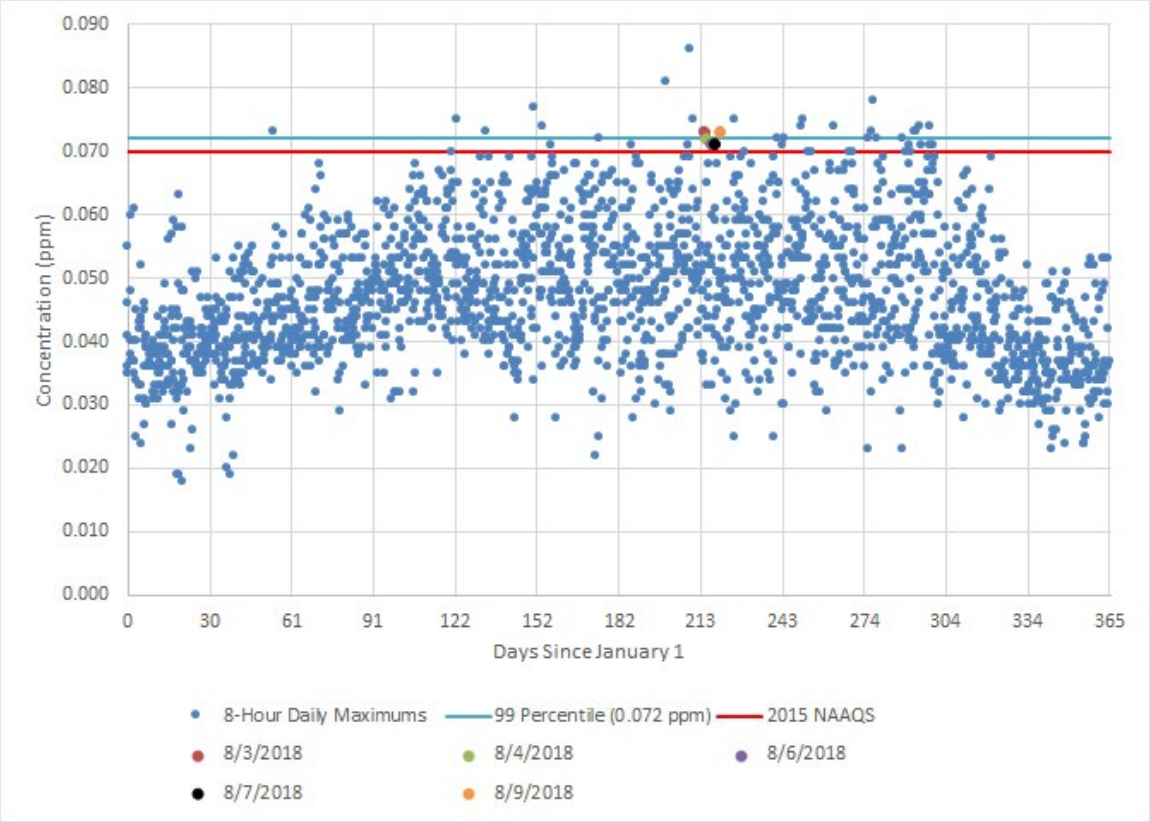
This section provides the documentation requested for a Tier 1 analysis per the *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations*.[33] The Tier 1 analysis is for wildfires that clearly influence monitored ozone exceedances or violations when they occur in an area that typically experiences lower ozone concentrations. This includes establishing the seasonality and/or distinctive level of the monitored ozone concentration as well as providing evidence that the wildfire emissions were transported to the monitors. Analyses presented in this document include 2013-2018 8-hour maximums (Figure 4-1) to show seasonality and non-event related concentrations, proximity of wildfires (Section II of the Narrative Conceptual Model chapter), and transport of emissions from wildfires to the Red Hills monitor (Section II of the Narrative Conceptual Model chapter and Section III of this chapter).

The key factor for Tier 1 requires establishing the seasonality and/or distinctive level of the monitored ozone concentration. The event-related exceedance occurs during a time of year that typically has no exceedances or is clearly distinguishable (at least 0.005 ppm higher) from non-event exceedances. Additionally, ozone impacts should be accompanied by clear evidence that the wildfire's emissions were transported to the location of the monitor.

Figure 4-1 shows that the exceedances at Red Hills occurred during the time of year where ozone concentrations tend to be higher, and that these exceedances are not clearly distinguishable from non-event exceedances as defined by guidance. Therefore, while these exceedances were high for the season, they do not qualify for a Tier 1 analysis.

[33] U.S. EPA, *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations*, p. 13, last accessed 7/26/21

Figure 4-1: Red Hills 8-Hour Daily Ozone Maximums by Day of the Year for 2013-2018



Although these exceedances do not qualify for Tier 1, evidence that the wildfire emissions were transported to the monitors is needed for further Tier 2 and Tier 3 analyses. Transport evidence is provided in Section III of this chapter as part of the Tier 3 analysis.

II. Tier 2 Key Factor Analysis

This section provides the documentation requested for a Tier 2 analysis, where ozone concentrations are not clearly higher than non-event related concentrations nor do they occur outside of the area's normal ozone season, in effect not meeting Tier 1 requirements. Tier 2 requires a demonstration that the impacts of the wildfire event on ozone are higher than a non-event related concentration and that fire emissions compared to the fire's distance from the monitor indicate a clear causal relationship. Analyses include those indicated in Section I of this chapter for Tier 1 as well as Q/D estimations, a more detailed comparison of the event-related ozone concentrations with non-event-related high ozone concentrations, and evidence that the emissions affected the monitor. The following sections provide the documentation requested for a Tier 2 analysis per U.S. EPA guidance[34]:

[34] Ibid, p. 15

Key Factor #1 - Fire emissions and distance of fire(s) to affected monitoring site location(s), and

Key Factor #2 – Comparison of the event-related ozone concentrations with non-event related high ozone concentrations.

Evidence that the fire emissions impacted the exceeding monitor are also required. This evidence is provided with satellite evidence of smoke at the monitor (Narrative Conceptual Model chapter and Section III of this chapter), graphs of nearby $PM_{2.5}$ concentrations nearby and in the same airshed (Section III of this chapter), and $PM_{2.5}$ speciation data near the wildfires impacting the monitor (Section III of this chapter), and differences in spatial and temporal patterns (Section III of this chapter).

A. Key Factor #1 (Q/D)

Key Factor 1 requires determining the fire emissions (Q) and the distance (D) between the wildfires to the affected monitor. CARB staff worked with U.S. EPA staff, and provided GIS shapefiles delineating fire perimeters, start dates, and end dates of all California wildfires in 2018 retrieved from the National Interagency Fire Center (NIFC). U.S. EPA modeled the wildfires and emissions, produced emissions estimates for the fires for each date, and calculated the summed aggregate of emissions divided by the distance (Q/D) for each day for each monitoring site.

1. Wildland Fire Emissions

Wildland fire emissions inside and outside the U.S. are estimated with the Fire Inventory from the National Center for Atmospheric Research (NCAR)[35] for 2020. Other years (such as 2018 and 2019) are based on the SmartFire2 (SF2)[36] and the BlueSky[37] systems. U.S. EPA has been using the Satellite Mapping Automated Reanalysis Tool for Fire Incident Reconciliation version 2 (SmartFire2; SF2) and the BlueSky Framework to estimate wildland fire emissions in the U.S. since 2005. SF2 is an algorithm and database system that combines multiple sources of fire information and reconciles them into a unified GIS database. It reconciles fire data from satellite sensors and ground-based reports, thus drawing on the strengths of both data types while avoiding double-counting of fire events.[38]

The BlueSky Framework estimates fuel type, fuel loading, fuel consumption, and emissions based on the location, type, and size information provided by SF2 for each wildland fire in the contiguous U.S. and Alaska. Fuel loading is based on the Fuel Characteristic Classification System (FCCS)[39] module and fuel consumption is based on the CONSUME[40] module. The

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[35] Wiedinmyer et al., 2011

[36] FireSmoke Canada, *SMARTFIRE Algorithm Description*, last accessed 7/29/21

[37] USDA Forest Service, *BlueSky Framework*, last accessed 7/29/21

[38] Larkin et al., 2020; Larkin et al., 2010

[39] USDA Forest Service, Pacific Northwest Research Station, *Fuel Characteristic Classification System*, last accessed 7/27/21

[40] USDA Forest Service, Pacific Northwest Research Station, *CONSUME*; last accessed 7/27/21

Fire Emissions Production Simulator (FEPS)[41] in the BlueSky Framework generated emission factors for wildland fires.

Daily emissions estimates for each wildland fire are processed for input to photochemical models using the Sparse Matrix Operator Kernel Emissions (SMOKE).[42] SMOKE is used to apply a fire type-specific diurnal profile and allocates total emissions of NOx, ROG, and $PM_{2.5}$ to specific model species needed for chemical mechanisms. Speciation profiles are based on those available in the SPECIATE database.[43]

2. Q/D Estimation

One approach to provide screening level information about wildland fire emissions' impact on ozone levels is to sum NO_x and ROG emissions for each fire and divide by distance between the fire and location of interest. Q/D is calculated using wildland fire emissions input files for the Community Multiscale Air Quality (CMAQ) modeling system. Wildland fire emissions input files for CMAQ have hourly emissions for each modeled species provided in files for specific days. Each day of the year has a different CMAQ input file for wildland fire emissions. Each emissions release point on the wildland fire CMAQ input file has daily total emissions of NO, NO_2, and ROG species summed. A set of gridded receptors is developed that often matches a commonly used model domain like the 12 km contiguous U.S. domain or 4 km California domain. The distance from each wildland fire is then calculated to each gridded receptor. This process is repeated for each fire on each day specific emissions input file. The Q/D for each fire in each grid cell is kept and then summed over all fires for that day to derive a daily Q/D at each receptor location from all fires for that day. The CMAQ input files do not have names associated with each of the wildland fire emissions release points so tracking fire specific emissions with this process is not possible. It does however provide a conservative estimate of wildland fire impacts since all fires are aggregated and it is possible to window the emissions so that only a subset of the emissions input file emission release points is used as part of the Q/D calculation (e.g., a box covering just the Pacific Northwest region).

3. Q/D Method Discussion and Results

The summed aggregate Q/D approach agreed upon by CARB and U.S. EPA staff differs from the published guidance, as the guidance weighted aggregate approach can lead to days where calculations for multiple fires impacting a site led to aggregate Q/D values that are less than an individual fire's calculated Q/D. A summed aggregate Q/D approach is one where emissions from wildfires are divided by the distance to a monitoring site, then summed together without any weighting for days when supported by indications of transport. This is a more accurate indication of multiple wildfire impacts at a site.

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[41] USDA Forest Service, Pacific Northwest Research Station, *Fire Emission Production Simulator (FEPS)*, last accessed 7/27/21

[42] UNC, Institute for the Environment, CMAS, *Sparse Matrix Operator Kernel Emissions (SMOKE) Modeling System*, last accessed 7/29/21

[43] U.S. EPA, Air Emissions Modeling, *SPECIATE*, last accessed 7/29/21

Further improving upon the summed aggregate Q/D approach, an "Effective Q/D" was calculated to account for periods where a partial day of Q/D buildup impacts the monitoring site or to attribute a percentage of an areawide summed aggregate Q/D when transport from a wildfire arrives by a significantly (day or more) earlier or later time. This Effective Q/D is calculated at the site for each day leading up to and including the days of the event for screening.

For the purpose of this analysis, the "Daily Q/D" is defined as the summed aggregate emissions of California based wildfires divided by each wildfire's centroid distance to the monitoring site. The Effective Q/D is the calculated adjustment of Q/D accounting for delays in transport and location, allowing for better approximation for screening emissions impacts at a site. As seen in Table 4-1, the Effective Q/D value was elevated for all dates being requested for exclusion but did not exceed the required Q/D criteria value 100. No requested dates qualify under the requirements for Tier 2 – Key factor #1.

Table 4-1: Estimated Q/D at Red Hills

Date	Exclusion Request	Daily Q/D	Effective Q/D Contributions	Effective Q/D	Rationale
8/1/2018		25.368	None	0	Prior day smoke cleared.
8/2/2018		24.242	None	0	No smoke.
8/3/2018	Yes	26.464	8/1 + 8/2	49.61	Estimate 8/1 was pooled then surged southward with 8/2, reaching site during 8/3.
8/4/2018	Yes	31.286	8/1 + 8/2 + 8/3	76.074	Estimate summed aggregate of 8/1 + 8/2 continued, plus 8/3 emissions transported to site during 8/4.
8/5/2018		34.691	None	0	Prior day smoke cleared.
8/6/2018	Yes	36.064	50%(8/4) + 8/5 + 25%(8/6)	59.35	Estimate about 50% of 8/4 was pooled plus 8/5 emissions transported to site during 8/6, plus 1/4 worth of 8/6 - attributed to Turkey Fire due to close proximity.
8/7/2018	Yes	24.925	50%(8/4) + 8/5 + 8/6	86.398	Estimate aggregate from prior day continued, plus remainder (75%) of emissions from 8/6 reached site during 8/7.
8/8/2018		27.321	50% Effective 8/7	43.199	Estimate 1/2 of prior day's effective Q/D was cleared, remainder persisted.
8/9/2018	Yes	23.046	Effective 8/8 + 8/8	66.245	Estimate 8/8's effective Q/D remained, plus 8/8's Q/D reached site during 8/9.

B. Key Factor #2 (Comparison)

Key Factor #2 in a Tier 2 demonstration requires a comparison of the event-related ozone concentrations with non-event-related high ozone concentrations. Statistical analyses of the

exceedances must either demonstrate that exceedance concentrations are in the 99th percentile of the 5-year distribution of ozone monitoring data, or one of the 4 highest ozone concentrations within the year.

The Red Hills 99th percentile value for the ozone season (January through December) is 0.072 ppm. The dates being requested for exclusion due to wildfire exceptional events are the top five concentrations in 2018 and in the 98th percentile for concentrations during the prior 5-year distribution of data as shown below in Table 4-2. Since two days (August 6 and August 7) are tied at 0.071 ppm and thus tied for 4th rank in 2018, all requested dates qualify under the requirements for Tier 2 – Key factor #2.

Table 4-2: Top 10 Max Daily 8-hour Ozone Concentrations in 2018

Date	8-hr Ozone	2018 Rank	5-year Percentile	Event
8/3/2018	0.073	1	99	EE
8/9/2018	0.073	1	99	EE
8/4/2018	0.072	3	99	EE
8/6/2018	0.071	4	98	EE
8/7/2018	0.071	4	98	EE
9/26/2018	0.070	6	98	
9/27/2018	0.070	6	98	
11/18/2018	0.069	8	97	
8/8/2018	0.068	9	97	Adjusted 4th High
10/27/2018	0.068	9	97	

III. Tier 3 Weight of Evidence

The following sections provide documentation requested for a Tier 3 analysis per U.S. EPA guidance[44] where the requested dates do not qualify for either a Tier 1 or a Tier 2 analysis. The Tier 3 analysis utilizes a more difficult "weight of evidence" approach with additional complex analyses to show a clear causal relationship between wildfire emissions and the ozone concentrations at a site.

There are other required elements in a Tier 3 analysis:

1. Evidence that the emissions from the wildfire affected the exceeding monitor.

This requirement is met through evidence shown in Sections II and III of the Narrative Conceptual Model chapter and Section III of this chapter, and particularly in the evidence of an ozone/$PM_{2.5}$ correlation (Figure 3-22) and the unusual ozone diurnal patterns seen in

[44] U.S. EPA, *Final Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations*, p.25, last accessed 7/29/21

Figures 4-16 to 4-22. Local social media reports of smoke in the vicinity can also be found in Appendix VI.

2. Evidence that the emissions were transported to the monitor.

This requirement is met through evidence given in the Narrative Conceptual Model chapter and this chapter using both backward trajectory analysis from the monitor as well as forward dispersion modeling from individual wildfires, satellite imagery and HMS satellite-derived smoke layers, NAAPS satellite-derived aerosol model results, meteorological analyses, and $PM_{2.5}$ concentration data in regions intersected by backward trajectories from the monitor.

3. Additional evidence that the emissions caused the exceedance by reaching the ground and affecting the monitors.

This requirement is met through the $PM_{2.5}$ trajectory analysis in the following section.

A. $PM_{2.5}$ Trajectory Analysis

$PM_{2.5}$ concentrations at sites along the trajectory paths (Figure 4-2 and the list of $PM_{2.5}$ monitoring sites below) from the Red Hills monitor show the impacts of the wildfires during the early August ozone event at Red Hills (Figure 4-3). Concentrations were low at most sites, except for sites in the San Joaquin Valley, until the afternoon of August 3. Concentrations in the San Joaquin Valley, as well as at some sites in the San Francisco Bay Air Basin, suddenly increased and remained high throughout August 4, decreasing in the late evening and for most of the morning of August 5. Concentrations again rose in the afternoon and stayed high at most sites in the San Joaquin Valley for the remainder of the event period. Sites in the North Central Coast and San Francisco Bay Area Air Basins remained low. These patterns followed the meteorological transport patterns discussed in the Narrative Conceptual Model chapter.

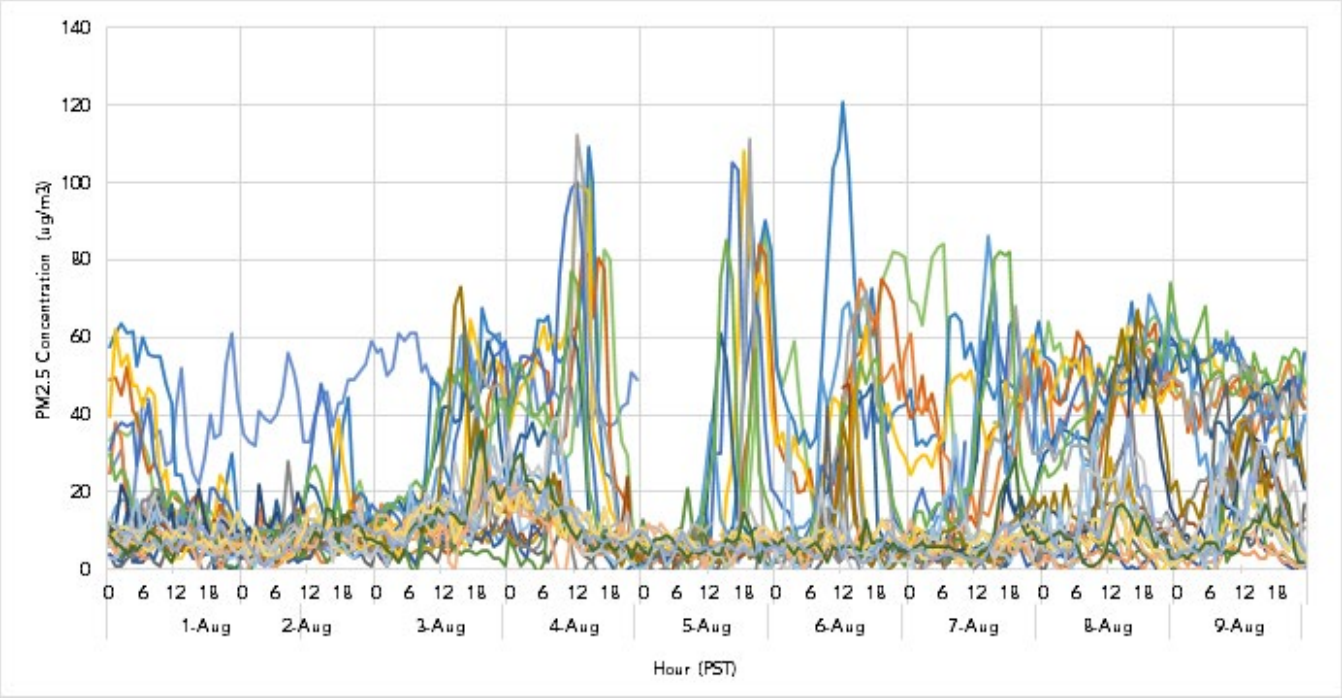
Figure 4-2: $PM_{2.5}$ monitoring sites along trajectory paths

List of $PM_{2.5}$ monitoring sites along trajectory paths

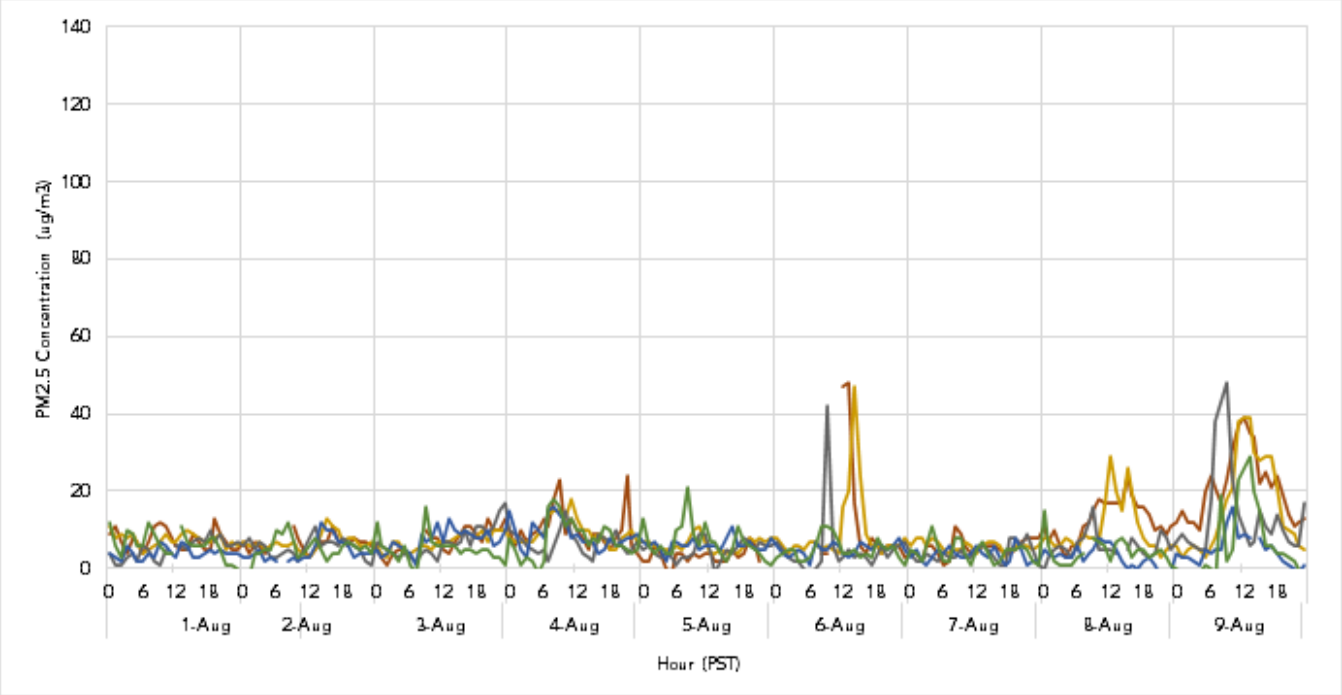
a. San Joaquin Valley Air Basin $PM_{2.5}$ sites
    i. Bakersfield-California
    ii. Corcoran
    iii. Fresno-Garland
    iv. Hanford
    v. Huron
    vi. Madera
    vii. Merced-Coffee
    viii. Modesto
    ix. Tracy
    x. Tranquility
    xi. Turlock
b. North Central Coast Air Basin $PM_{2.5}$ sites
    i. Carmel Valley
    ii. Hollister
    iii. King City
    iv. Salinas
    v. Santa Cruz
c. San Francisco Bay Air Basin $PM_{2.5}$ sites
    i. Berkeley
    ii. Concord
    iii. Gilroy
    iv. Livermore
    v. Redwood City
    vi. San Francisco
    vii. San Jose-Jackson
    viii. San Jose-Knox
    ix. Oakland-International
    x. Laney College
    xi. San Pablo
    xii. San Rafael
    xiii. Vallejo

Figure 4-3: $PM_{2.5}$ concentrations at select sites along back-trajectories from the Red Hills Monitor, August 1 to 9, 2018.

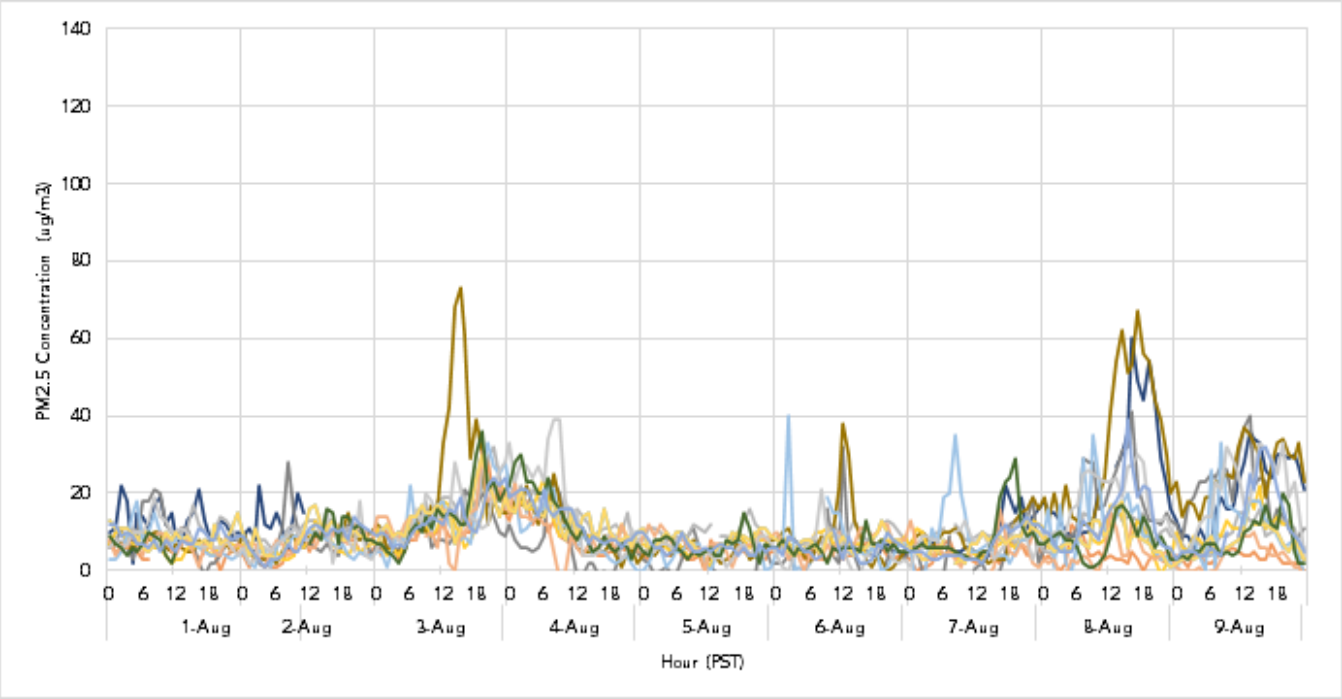
a. All sites



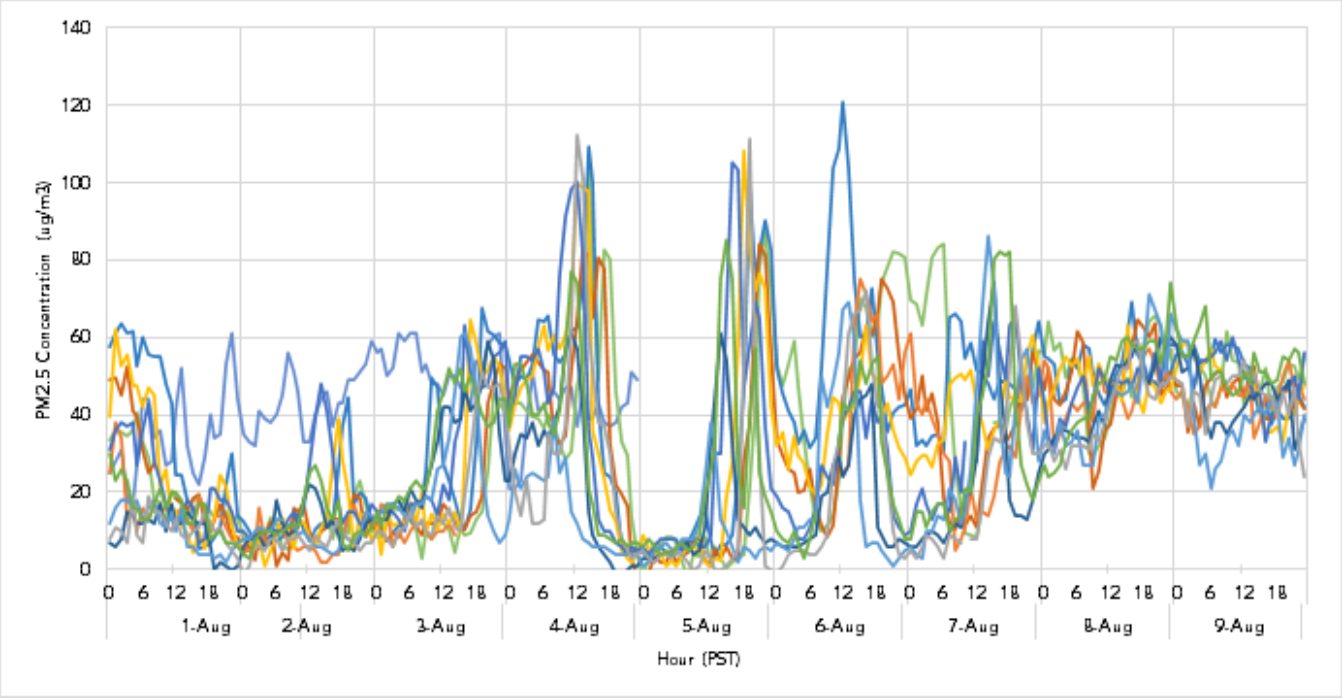
b. North Central Coast Air Basin



c. San Francisco Bay Area Air Basin



d. San Joaquin Valley Air Basin

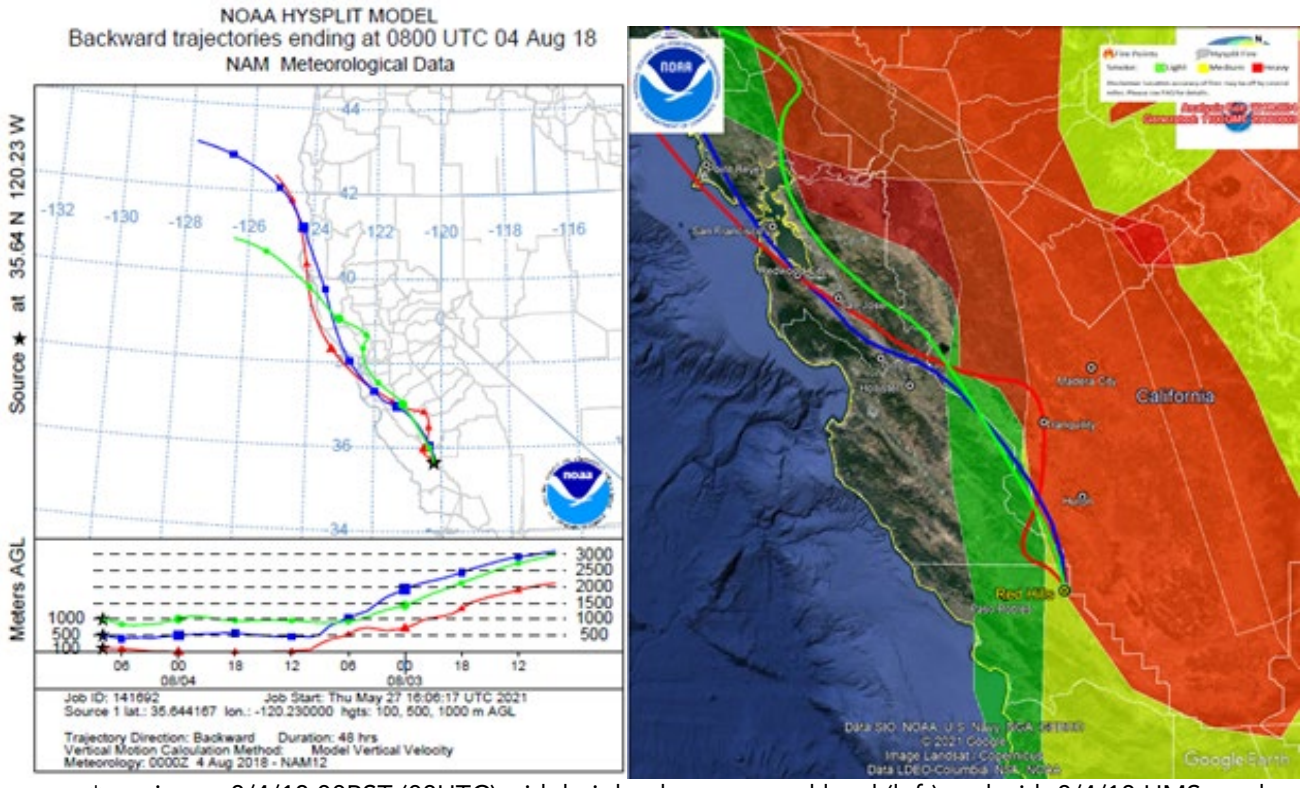


1. August 3, 2018

Tracing impacts on the Red Hills monitor backwards from the 00PST hour on August 4 (1 hour after the August 3 high value and the second of eight hours of increasing

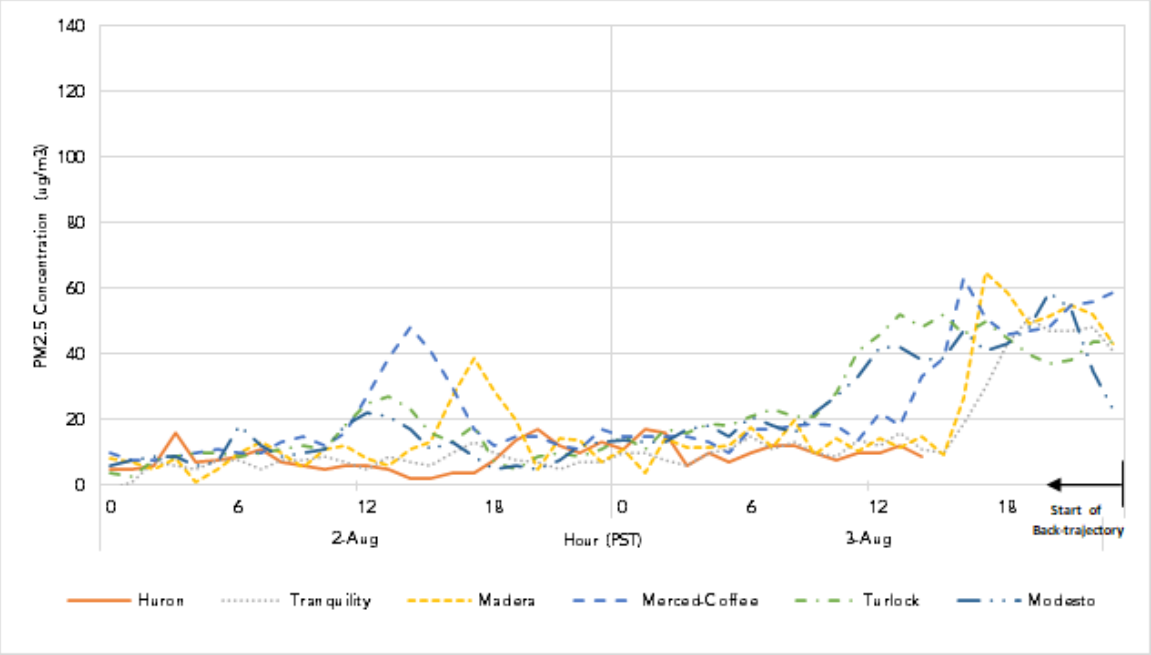
concentrations) indicates influence from the California coastal region well up to the Oregon border as well as from the central portions of California, particularly the San Joaquin Valley (Figure 4-4). The red line denotes the approximate altitude at the surface (100 meters (m) above ground level to account for local terrain), with the blue line (500m) and the green line (1000m) giving an indication of transport from higher in the atmosphere. The heights of these back trajectories show that they all originated above 2000m near the Oregon border, descending as they neared the monitor. The surface back trajectory (100m) reached ground level while in the San Joaquin Valley when $PM_{2.5}$ concentrations were increasing in the afternoon and evening, seen particularly at Tranquility and Madera (Figure 4-5). Unfortunately, the monitor at Huron, one of the few on the western side of the Valley, did not collect data past 14PST.

Figure 4-4: NOAA HYSPLIT back-trajectory from Red Hills, August 4, 2018*



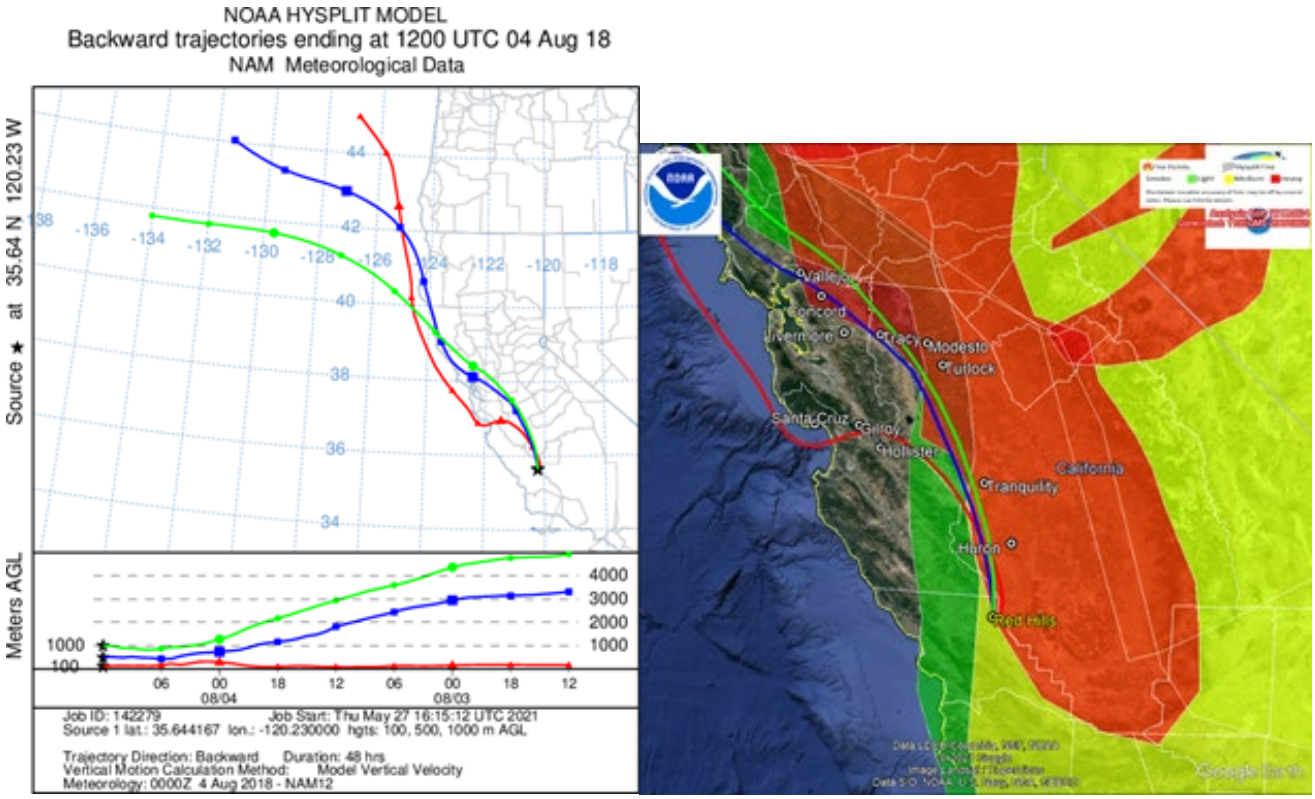
*starting at 8/4/18 00PST (08UTC) with height above ground level (left) and with 8/4/18 HMS smoke layer (right).

Figure 4-5: $PM_{2.5}$ hourly concentrations at sites along back-trajectory starting at 8/4/18 00PST (08UTC)



The back-trajectory from 4am (04PST) on August 4 (the first of the two highest hours in the 8-hour ozone period that began on August 3) indicates influence from the California coastal region was minimal, with greater impacts from the San Joaquin Valley (Figure 4-6).

Figure 4-6: NOAA HYSPLIT back-trajectory from Red Hills, August 4, 2018*

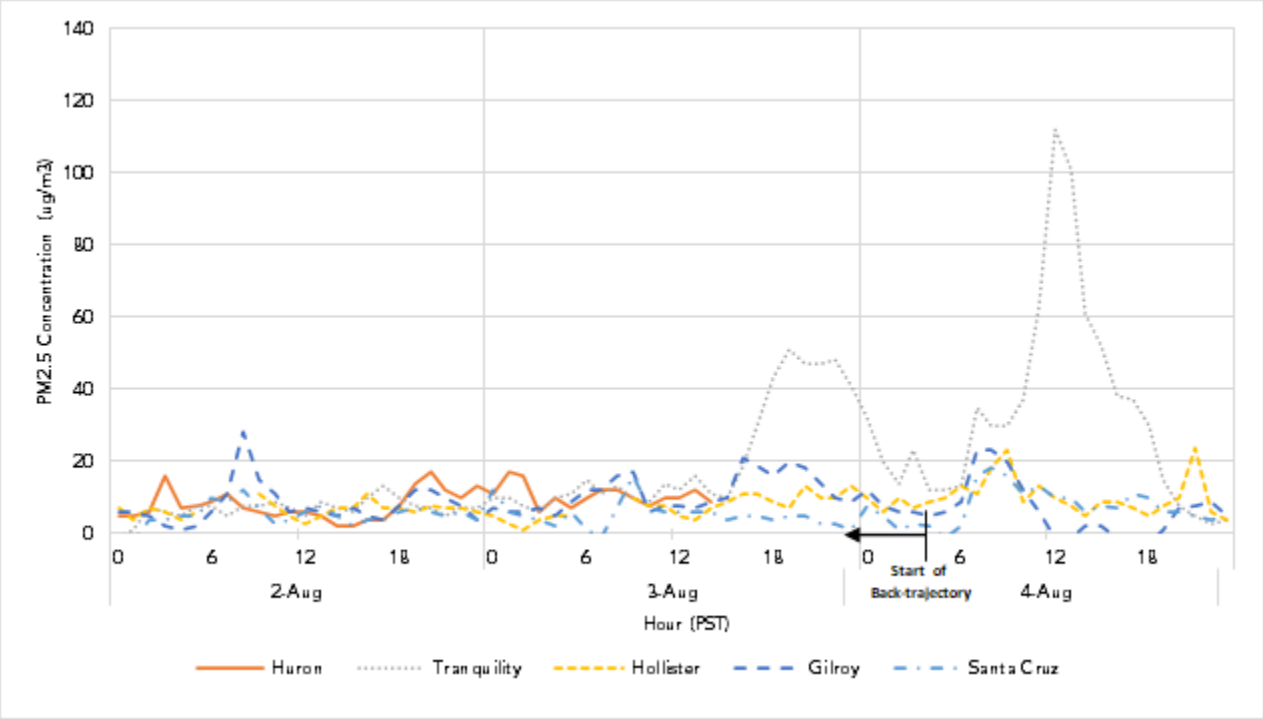


*starting at 8/4/18 04PST (12UTC)) with height above ground level (left) and with 8/4/18 HMS smoke layer (right).

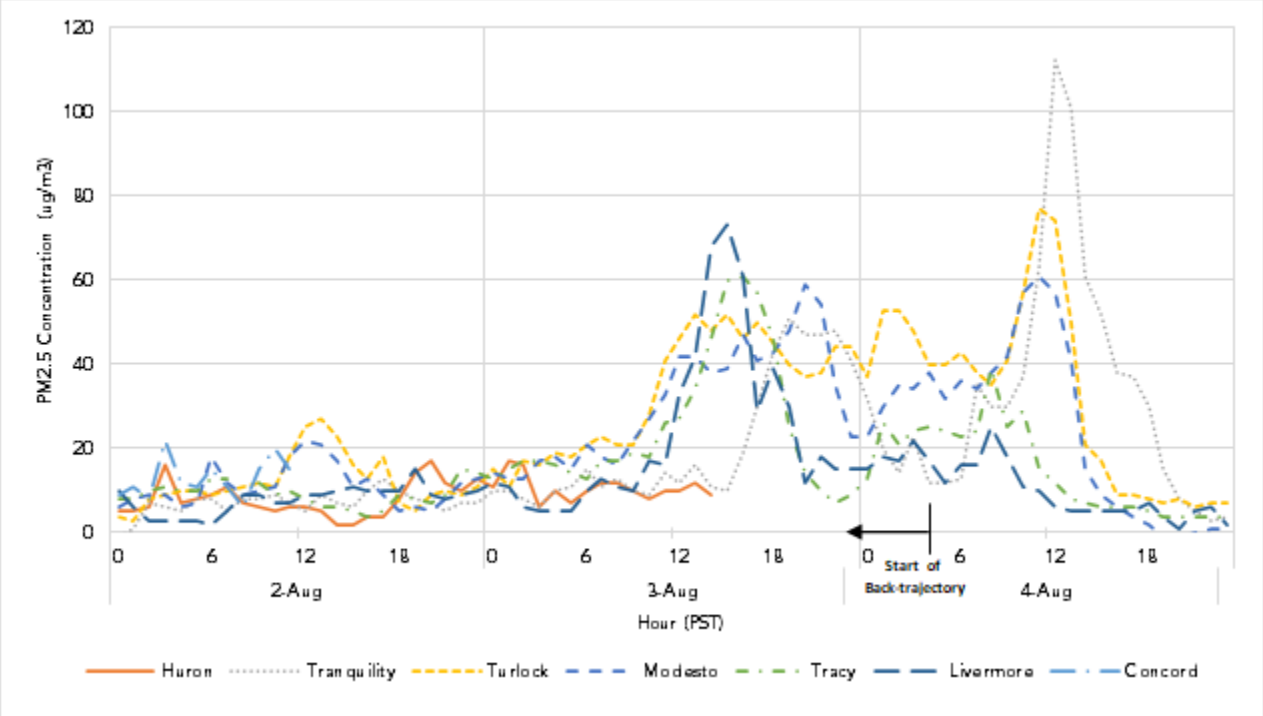
The three different back-trajectory heights all indicate influence from the growing smoke plume settling into the Valley. The surface back trajectory (100m) reached ground level while in the San Joaquin Valley when $PM_{2.5}$ concentrations were increasing overnight (Figure 4-7). Livermore and Concord, further north and earlier in the trajectory path also showed the higher concentrations seen in the north and potentially transported to the Red Hills monitor

Figure 4-7: $PM_{2.5}$ hourly concentrations at sites along back-trajectory starting at 8/4/18 04PST (12UTC)

a. Following 100m height back-trajectory (red)



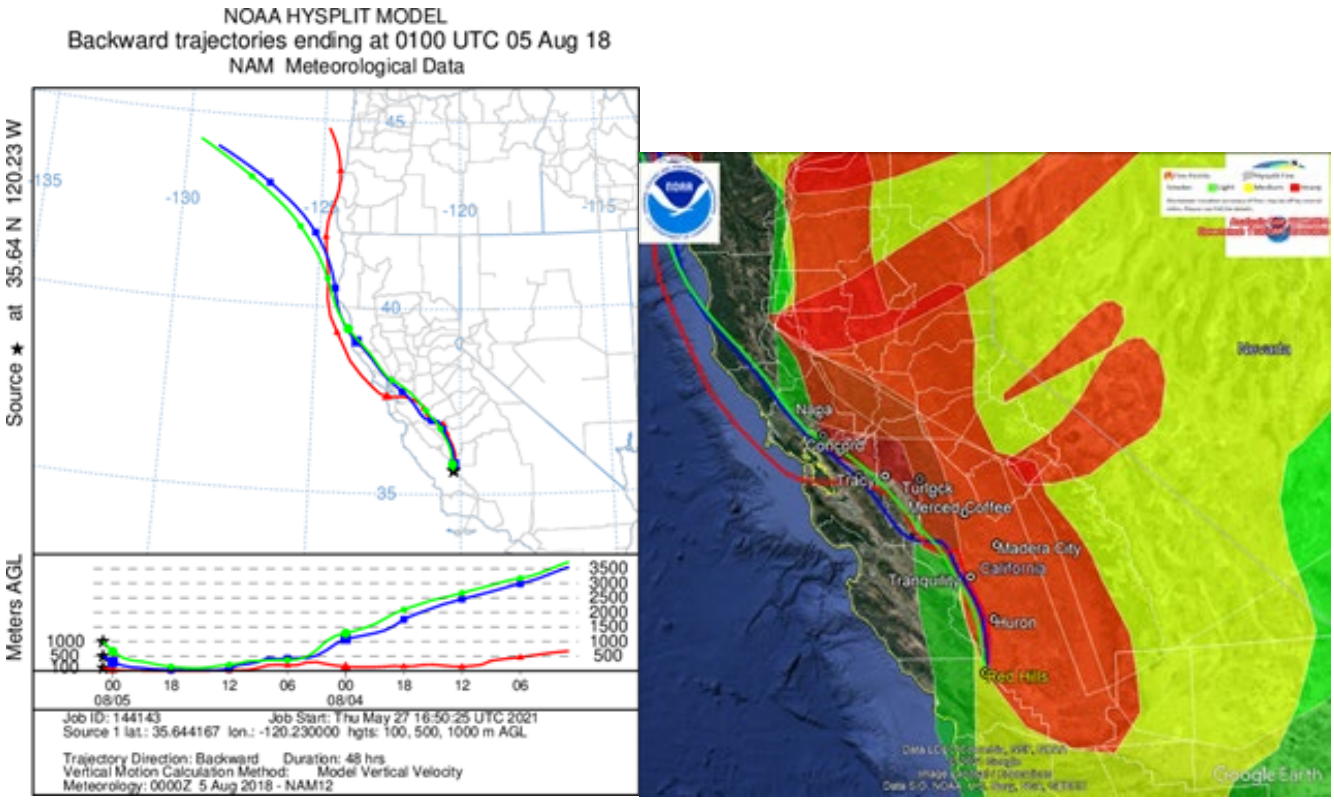
b. Following 500m height back-trajectory (blue)



2. August 4, 2018

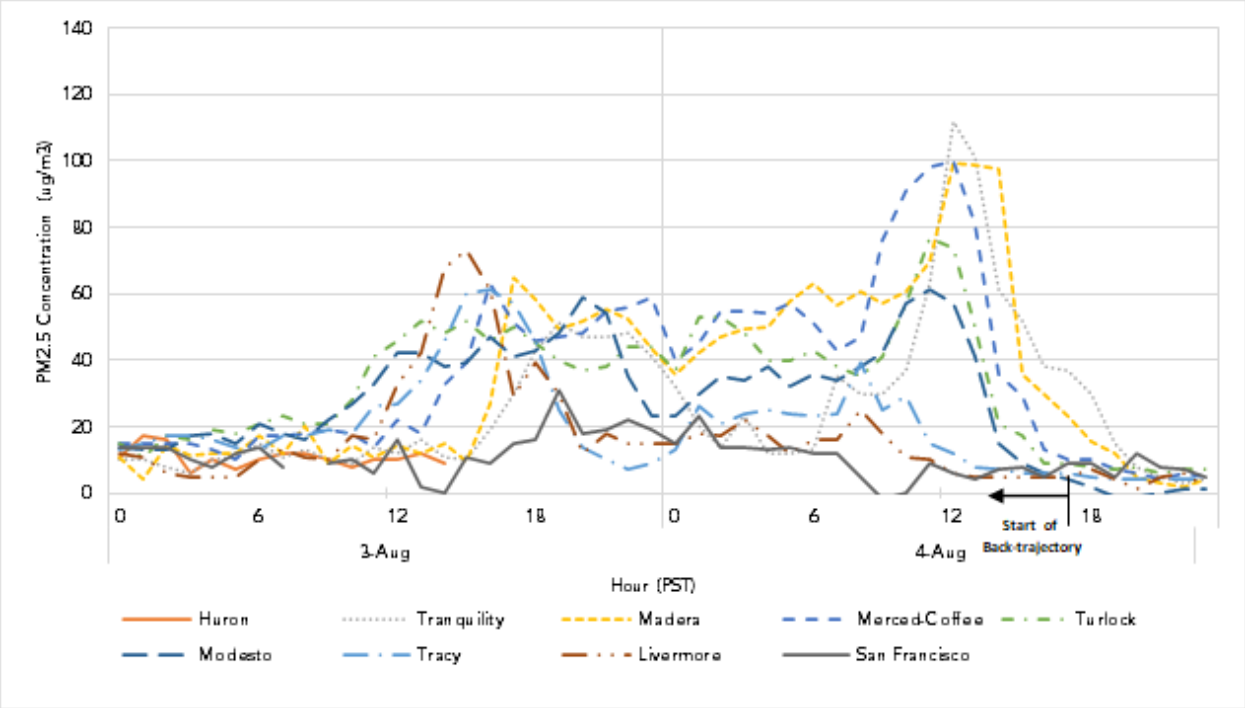
The back-trajectory from 5pm (17PST) on August 4, (the highest hour in the 8-hour ozone period that began at 11am) indicates increased influence from the San Joaquin Valley (Figure 4-8). All three back-trajectory heights indicate surface influence in the 12 hours before reaching the Red Hills monitor with the near-surface back trajectory (100m) showing ground-level influence for most of the 36 hours of the modeled run. Monitors in the San Joaquin Valley saw $PM_{2.5}$ concentrations spiking mid-day on August 4 (Figure 4-9) before decreasing to very low concentrations overnight.

Figure 4-8: NOAA HYSPLIT back-trajectory from Red Hills, August 4, 2018*



*starting at 8/4/18 17PST (8/5/21 01UTC) with height above ground level (left) and with 8/4/18 HMS smoke layer (right).

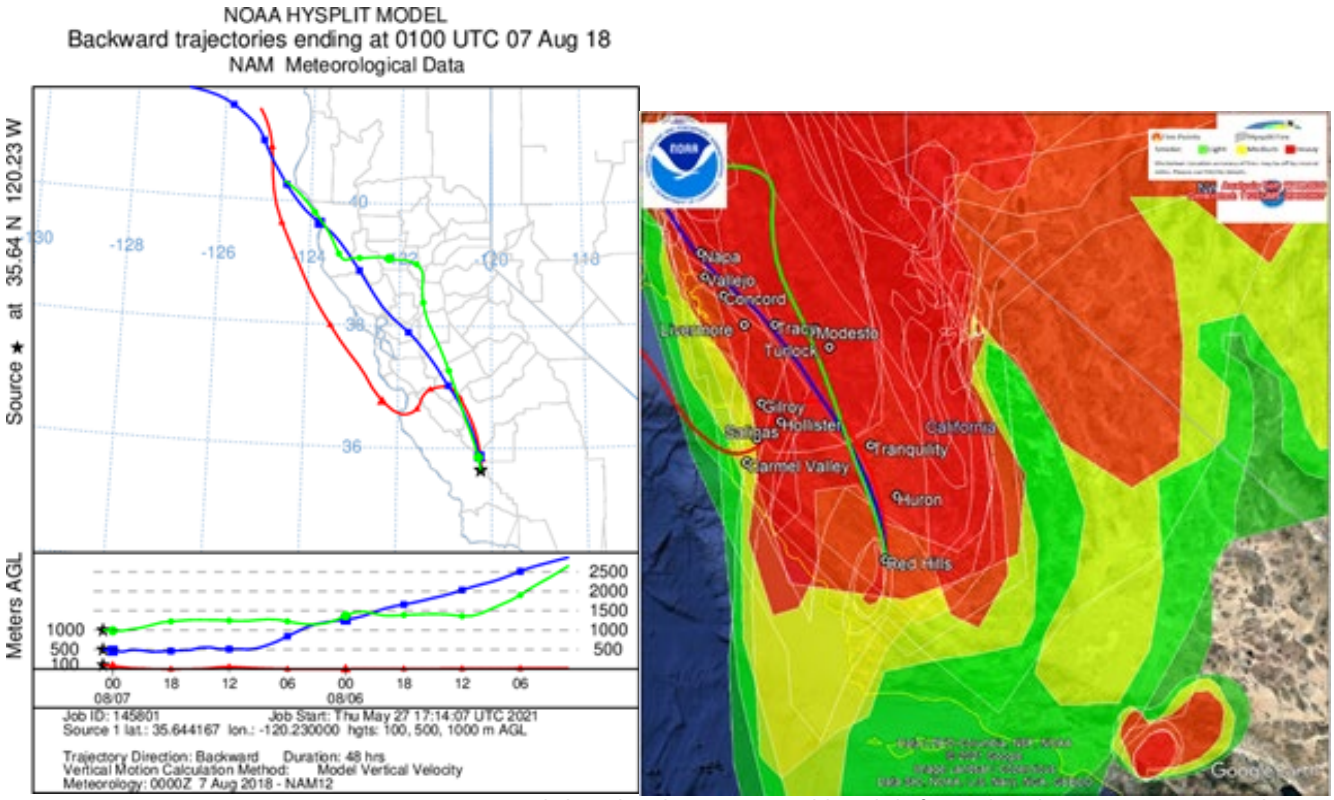
Figure 4-9: $PM_{2.5}$ hourly concentrations at sites along back-trajectory starting at 8/4/18 17PST (8/5/18 01UTC)



3. August 6, 2018

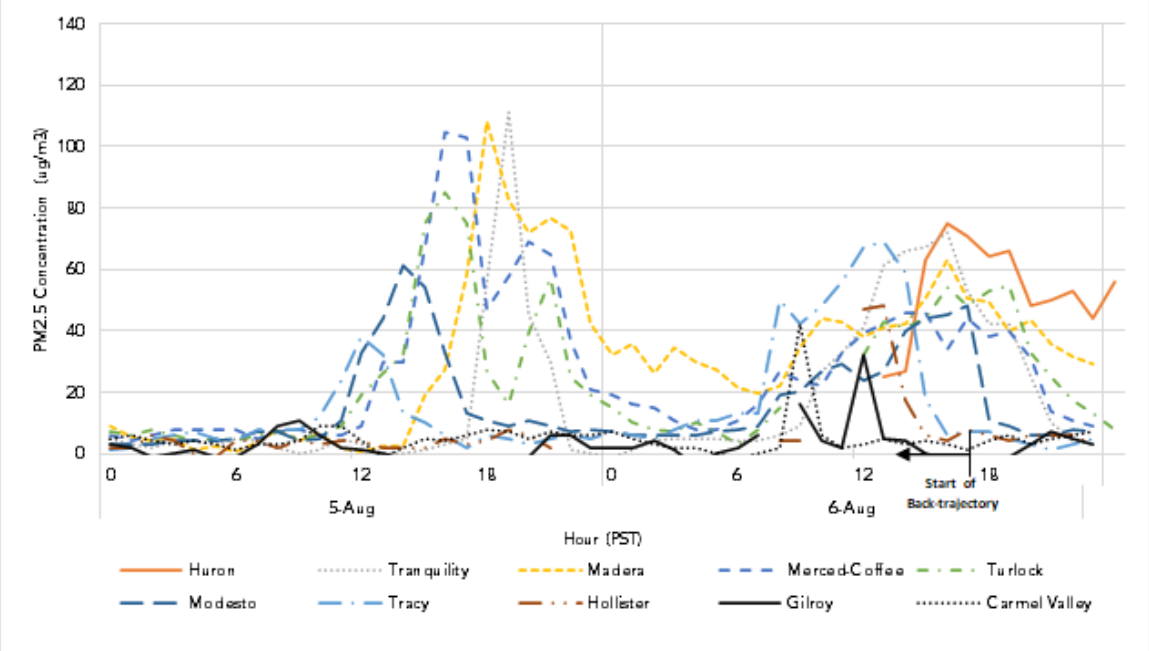
The back-trajectory from 5pm (17PST) on August 6 (the highest hour in the 8-hour ozone period that began at 1pm) indicates continued significant influence from the San Joaquin Valley (Figure 4-10). The near-surface back trajectory (100m) showed ground-level influence the entirety of the modeled run. Monitors in the San Joaquin Valley saw consistent $PM_{2.5}$ concentration increases beginning the morning of August 6 (Figure 4-11) while monitors in the North Central Coast Air Basin showed intermittent spikes in concentrations.

Figure 4-10: NOAA HYSPLIT back-trajectory from Red Hills, August 6, 2018*



*starting at 8/6/18 17PST (8/7/21 01UTC) with height above ground level (left) and with 8/6/18 HMS smoke layer (right).

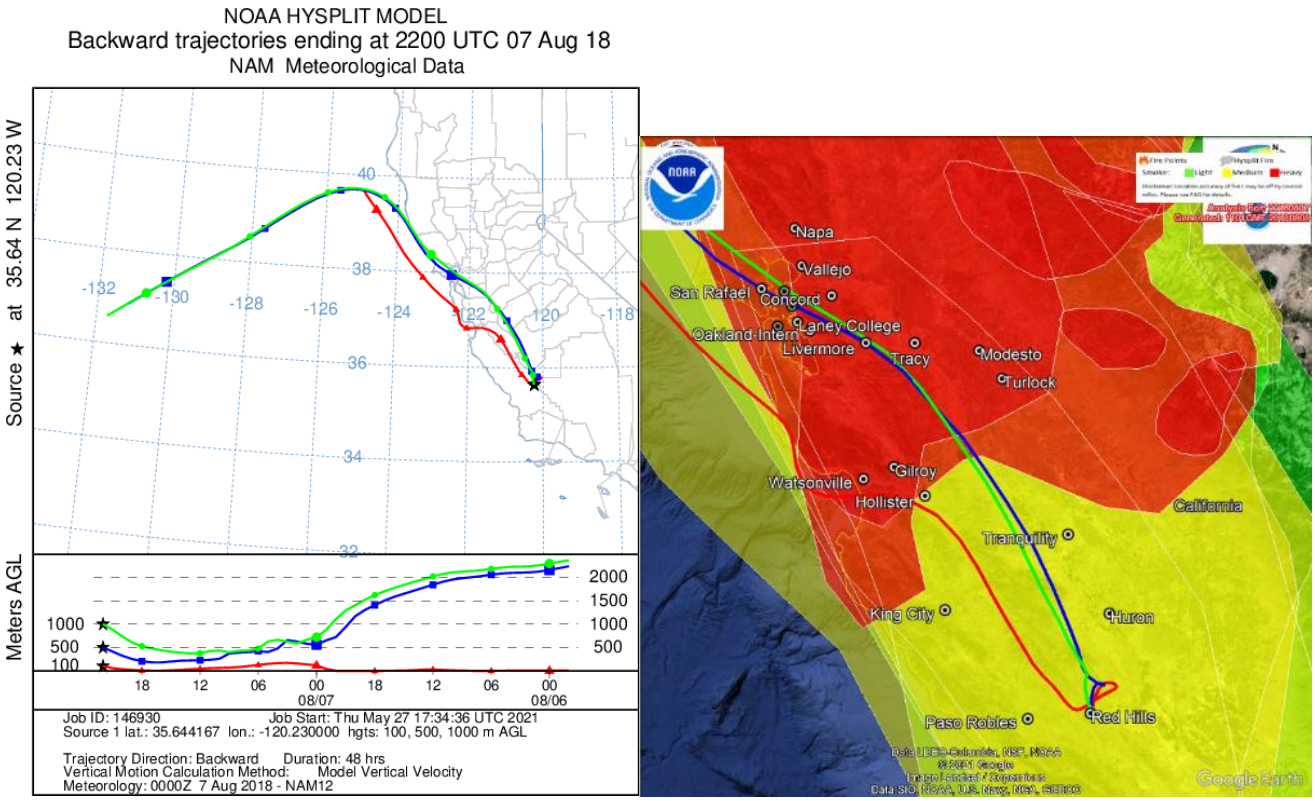
Figure 4-11: $PM_{2.5}$ hourly concentrations at sites along back-trajectory starting at 8/6/18 17PST (8/7/18 01UTC)



4. August 7, 2018

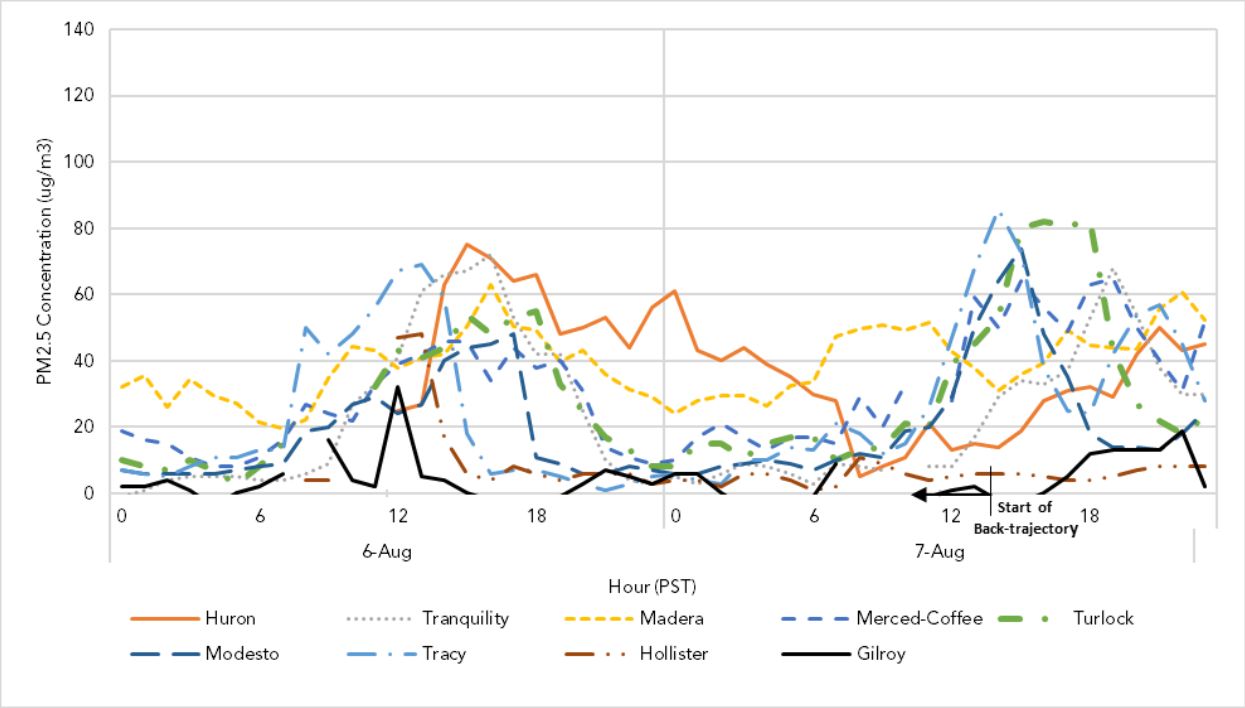
The back-trajectory from 2pm (14PST) on August 7 (the highest hour in the 8-hour ozone period that began at noon) still shows continued influence from the San Joaquin Valley (Figure 4-12). The near-surface back trajectory (100m) skirted the western slope of the San Joaquin Valley when concentrations at Huron were high (Figure 4-13). Upper atmosphere transport was clearly through the eastern portion of the San Francisco Bay Area, the western portion of the Sacramento Valley, and through the middle of the San Joaquin Valley before impacting the monitor at Red Hills.

Figure 4-12: NOAA HYSPLIT back-trajectory from Red Hills, August 7, 2018*



*starting at 8/7/18 14PST (22UTC) with height above ground level (left) and with 8/7/18 HMS smoke layer (right).

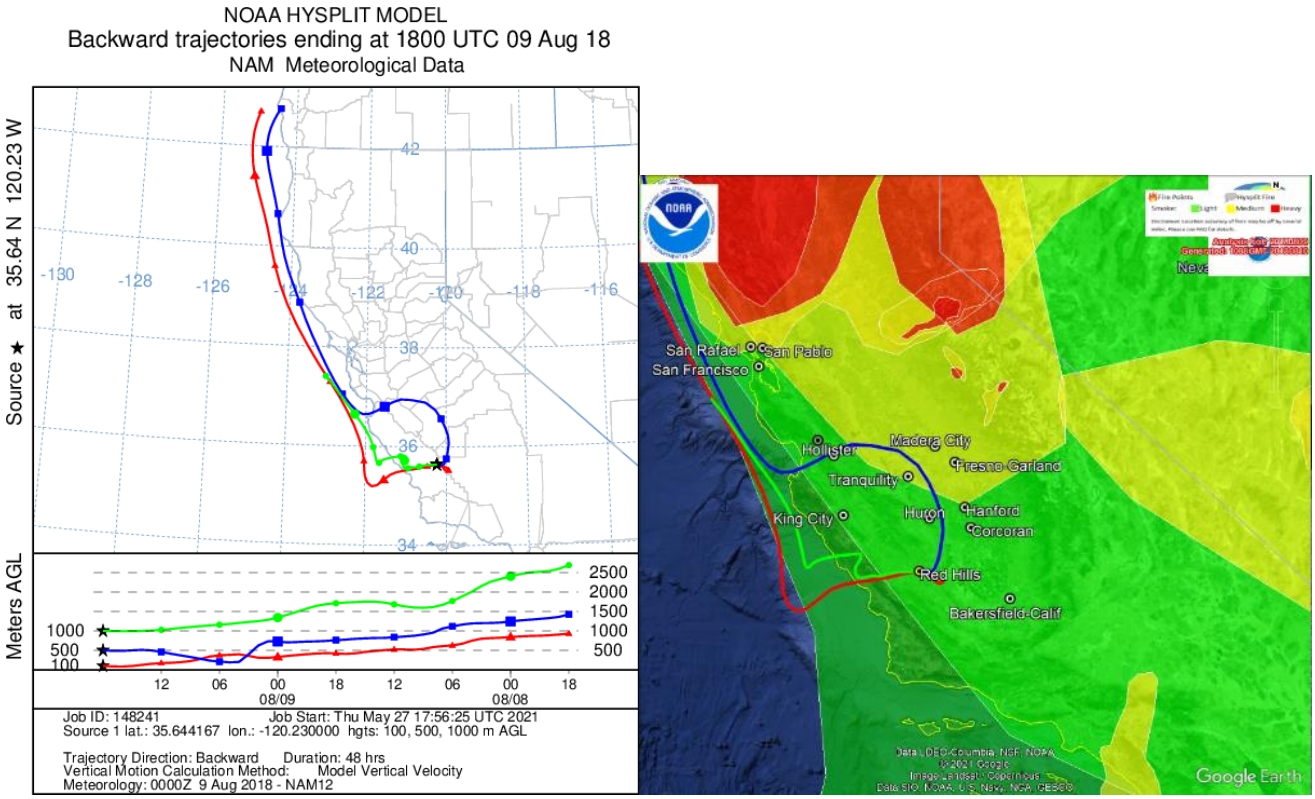
Figure 4-13: $PM_{2.5}$ hourly concentrations at sites along back-trajectory starting at 8/7/18 14PST (22UTC)



5. August 9, 2018

The back-trajectory from 10am on August 9 (the first of the two highest hours in the 8- hour ozone period that began at 7am) indicates influence from the California coastal region, as well as the San Joaquin Valley (Figure 4-14). The surface back trajectory (100m) dipped briefly into the San Joaquin Valley while concentrations at Bakersfield-California were high. Some influence from sites in the North Central Coast Air Basin (represented by King City) and the San Francisco Bay Area when concentrations were peaking slightly, but the influence is likely minimal. The mid-level trajectory (500m) dipped to near-surface levels while in the San Joaquin Valley, likely providing the greater influence on air quality at the Red Hills monitor (Figure 4-15).

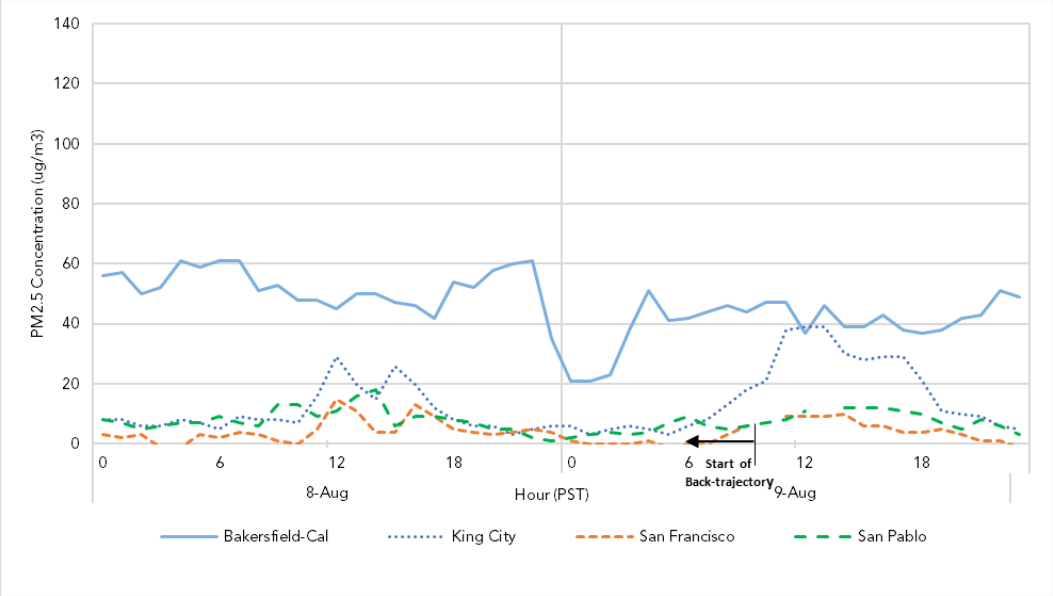
Figure 4-14: NOAA HYSPLIT back-trajectory from Red Hills, August 9, 2018*



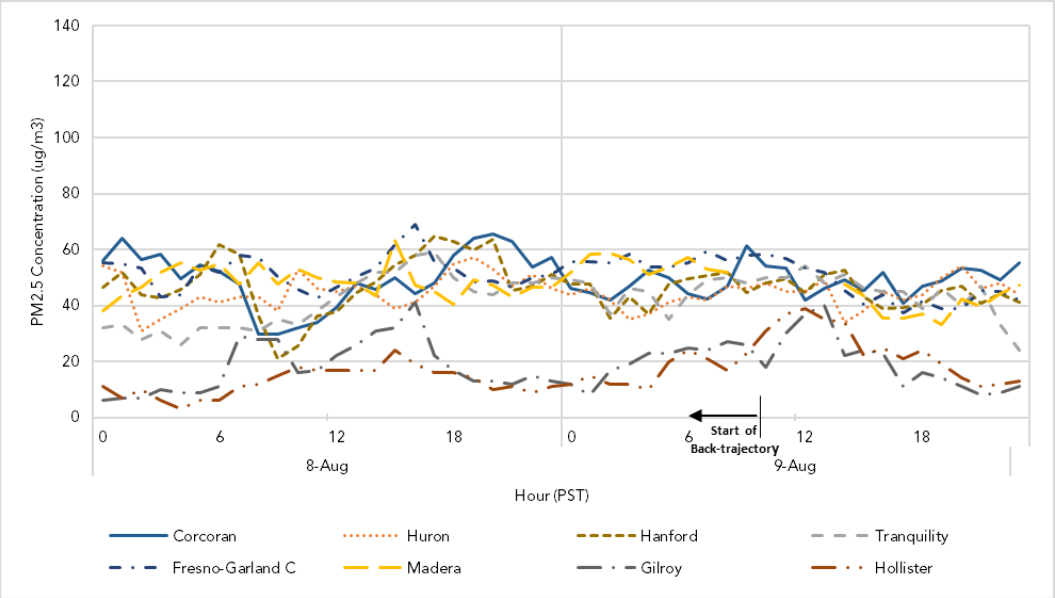
*starting at 8/9/18 10PST (18UTC) with height above ground level (left) and with 8/9/18 HMS smoke layer (right).

Figure 4-15: $PM_{2.5}$ hourly concentrations at sites along back-trajectory starting at 8/9/18 10PST (18UTC)

a. Following 100m height back-trajectory (red)



b. Following 500m height back-trajectory (blue)



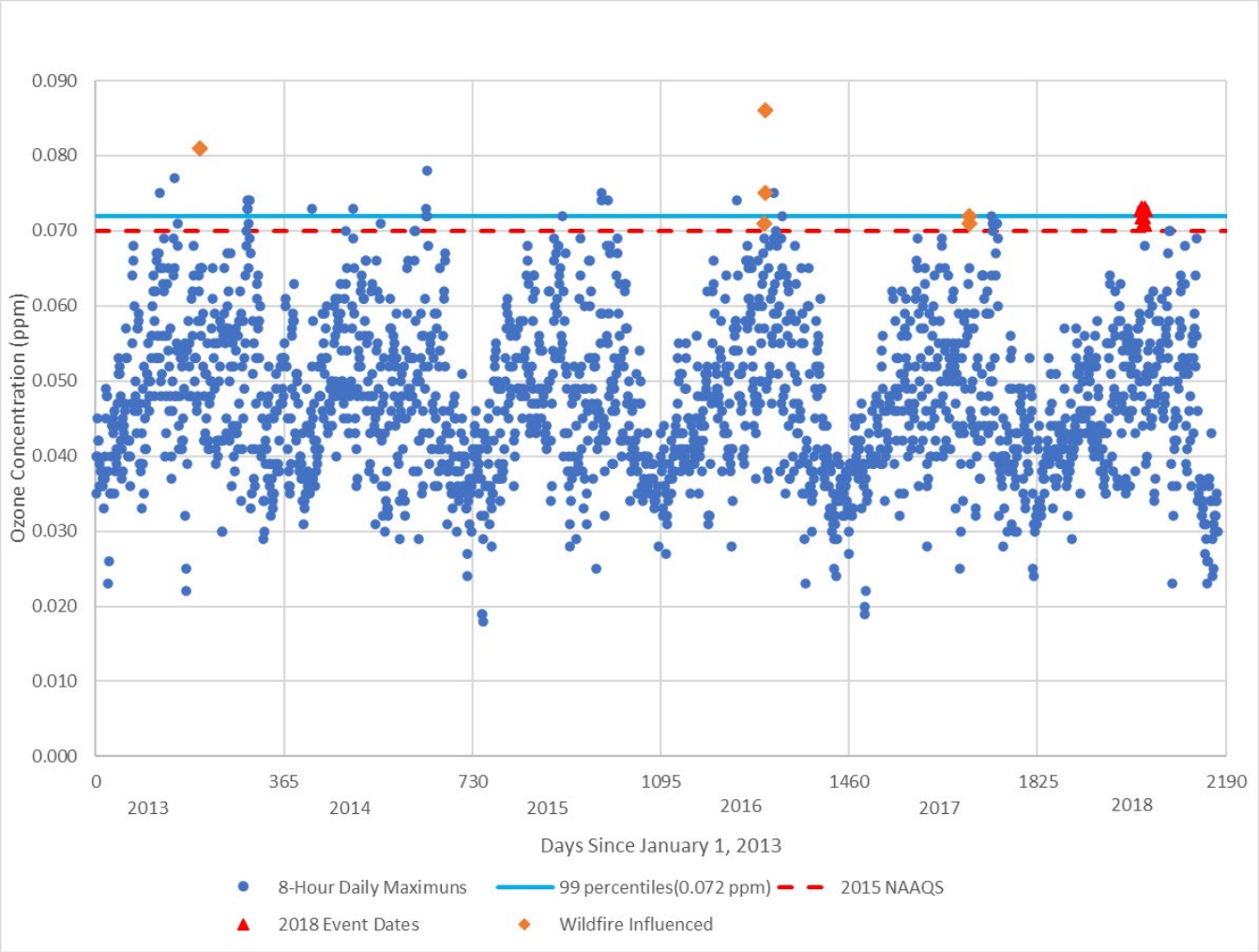
B. Ozone

1. 8-Hour Ozone

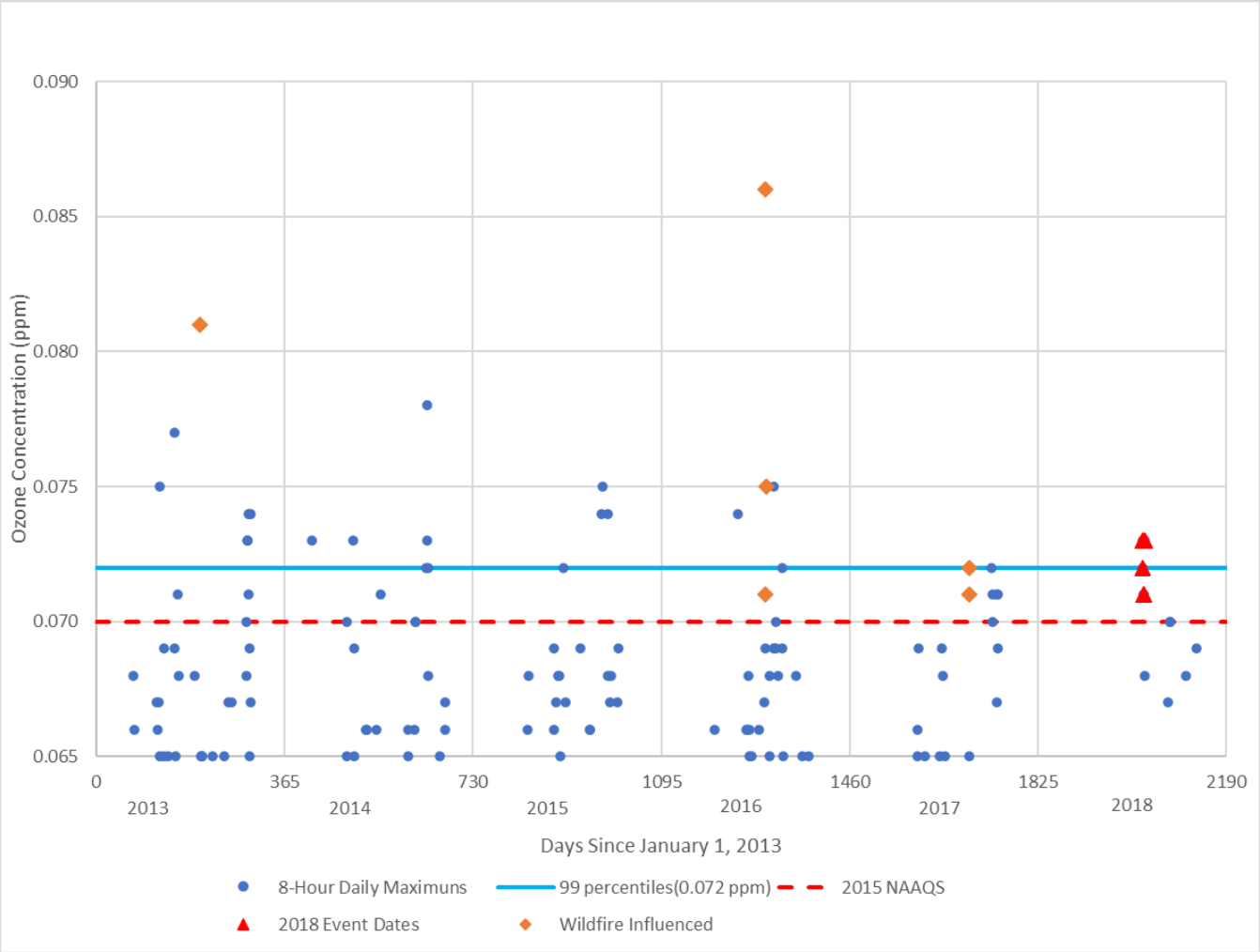
Potential wildfire influenced exceedances from 2013 to 2017 (orange diamonds) were analyzed for consideration of the impact upon historical exceedances, as shown below in Figures 4-16a (all days) and 4-16b (all days over 0.065ppm). These impacted days were determined by reviewing daily HMS smoke layers for historical exceedances and marked for wildfire influence where smoke was indicated aloft near the Red Hills site. Although these dates have not undergone the rigor of an exceptional events demonstration, as they did not fulfil the regulatory determination requirement, concentrations are believed to have been influenced by wildfire smoke and associated ozone precursors. The 2018 wildfire-influenced exceedances, which impact the upcoming regulatory determination, are shown as red triangles.

Figure 4-16: Red Hills 8-Hour Daily Ozone Maximums 2013-2018

a. All Days



b. All Days Over 0.065 ppm



2. 1-Hour Ozone

The following figures compare the daily diurnal pattern for each exceedance day with the hourly diurnal percentiles for ozone from 2013-2017. Concentrations during August 3 (Figure 4-17) remain near to above normal throughout the morning and afternoon hours (excluding the hours from 8am to 11am when there was no power at the monitoring site. Ozone climbs above the 95th percentile after 9pm (21PST), strongly indicating transport as the pollution source, as polluted air from the northern Mendocino Complex (Ranch and River Fires) reach the site. Ozone values remain at or above the 95th percentile throughout the morning and daytime during August 4 (Figure 4-18) as smoke persists through much of the day before rapidly clearing the area after 8pm (20PST). Concentrations remain below or near average throughout August 5 (Figure 4-19) while the area remains clear of smoke.

Figure 4-17: Percentiles for Seasonal 1-Hour Ozone for 2013-2017 compared with 8/3/2018

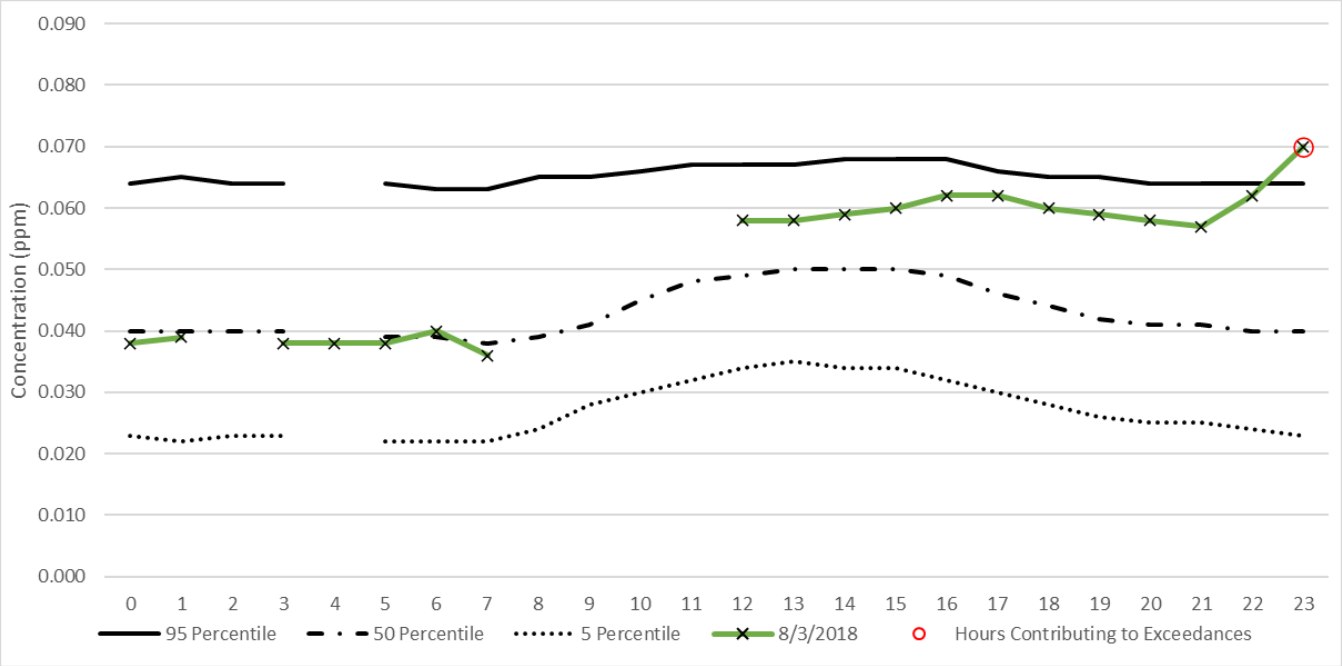


Figure 4-18: Percentiles for Seasonal 1-Hour Ozone for 2013-2017 compared with 8/4/2018

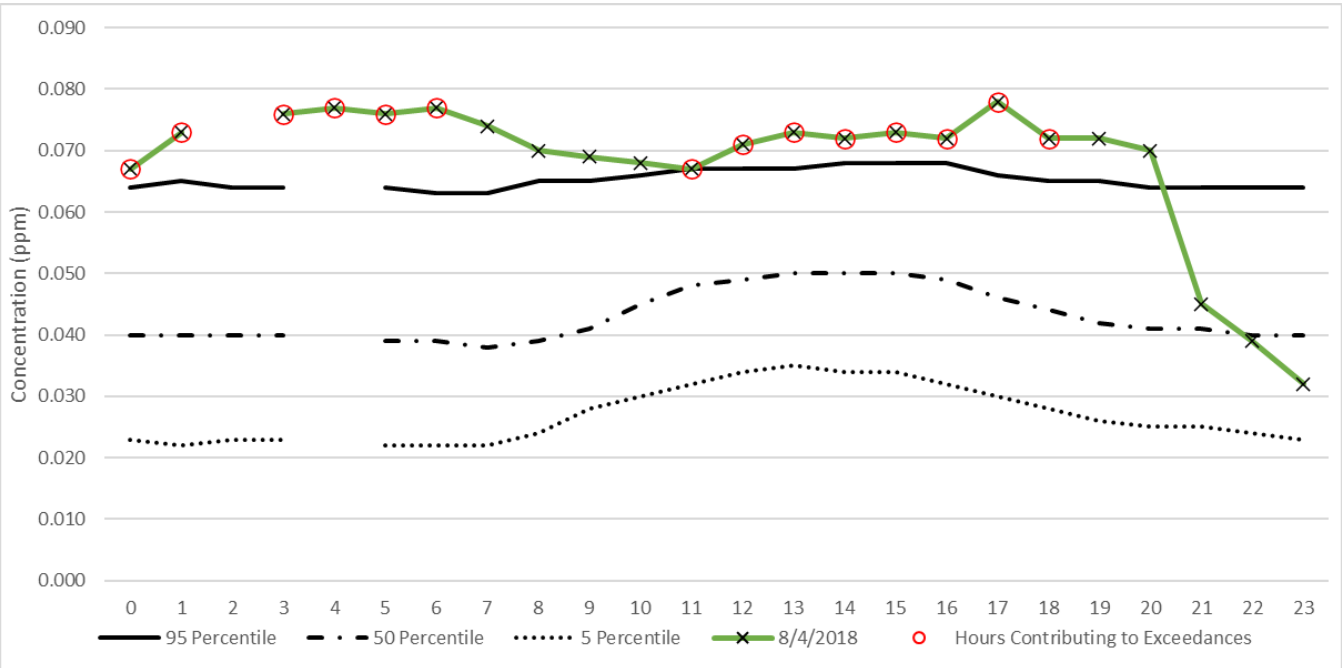
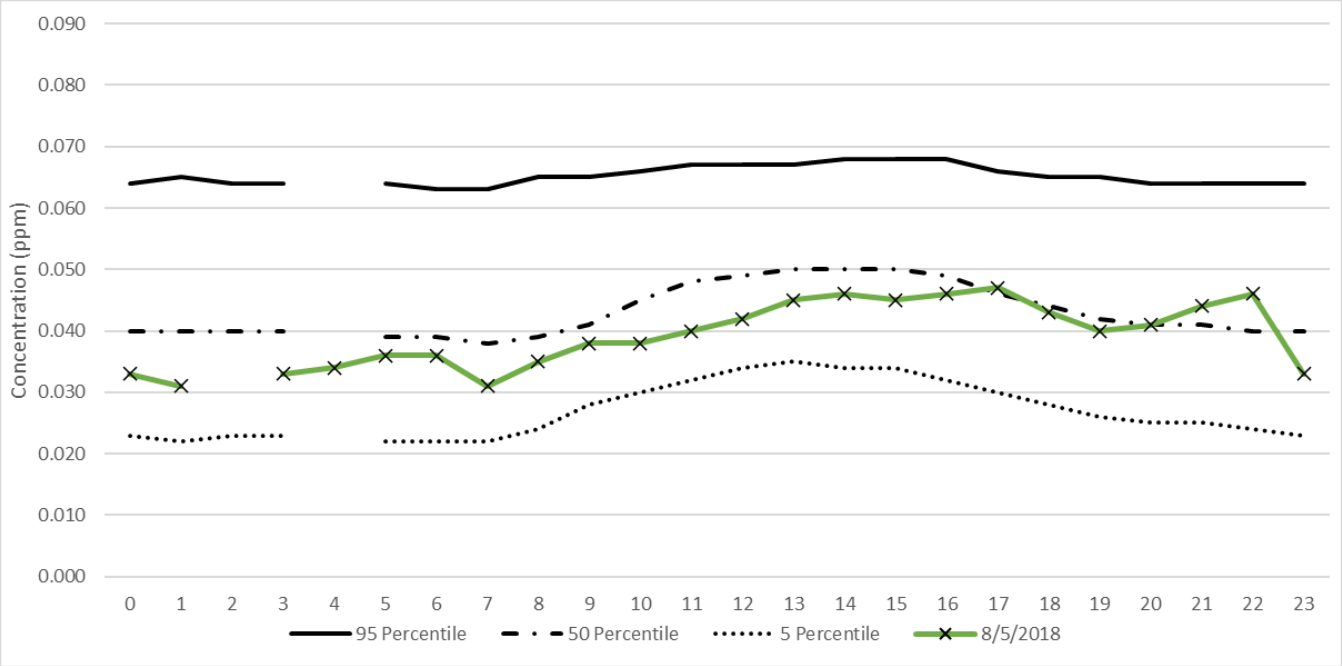


Figure 4-19: Percentiles for Seasonal 1-Hour Ozone for 2013-2017 compared with 8/5/2018



During August 6, elevated ozone concentrations are primarily driven by emissions from the nearby upwind Turkey fire, which sparked at approximately 1pm (13PST) (Appendix VI),[45] with long distance contributions from the Mendocino Complex. Ozone temporarily decreases overnight as containment is gained on the Turkey Fire but remains elevated with the additional impact of smoke from the very long distance fires of Klondike and Natchez (Figure 4-20). During August 7, additional smoke and ozone precursors were transported to the site from the Donnell, Ferguson, Carr, and Taylor Creek Fires, contributing to ozone concentrations exceeding the 95th percentile (Figure 4-21).

[45] Monterey Herald: *Turkey Flats fire in South Monterey County fully contained after burning 2,225 acres*

Figure 4-20: Percentiles for Seasonal 1-Hour Ozone for 2013-2017 compared with 8/6/2018

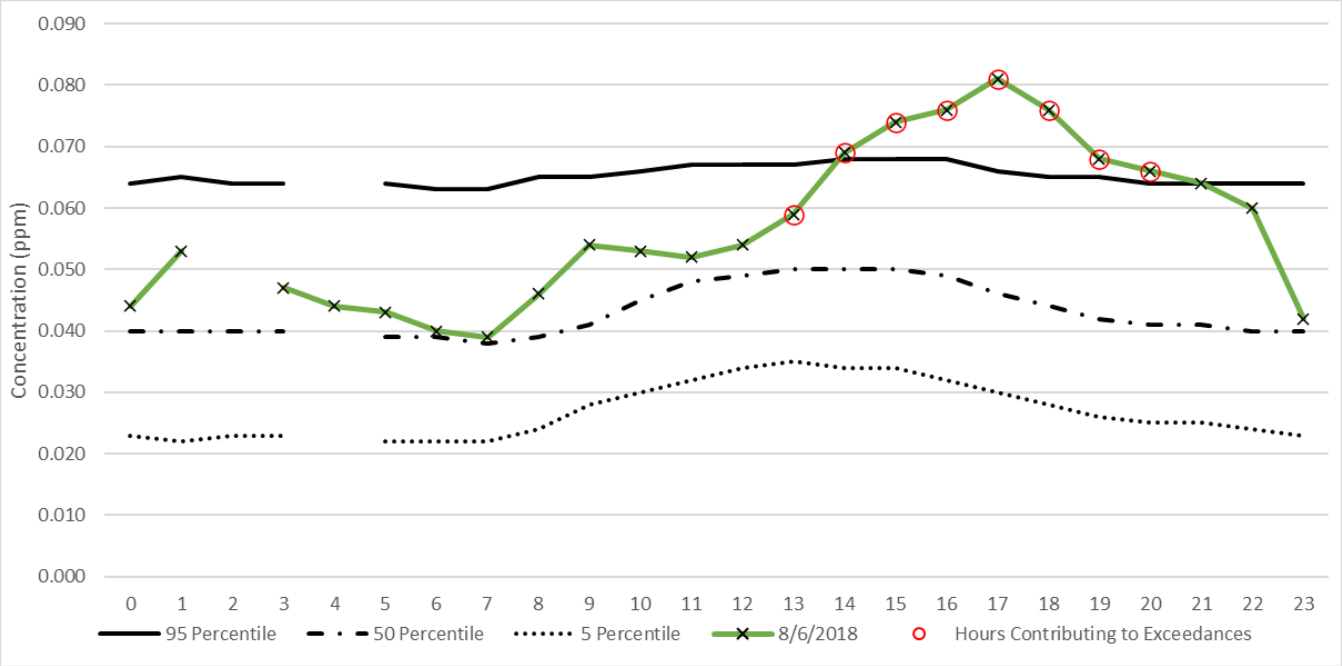
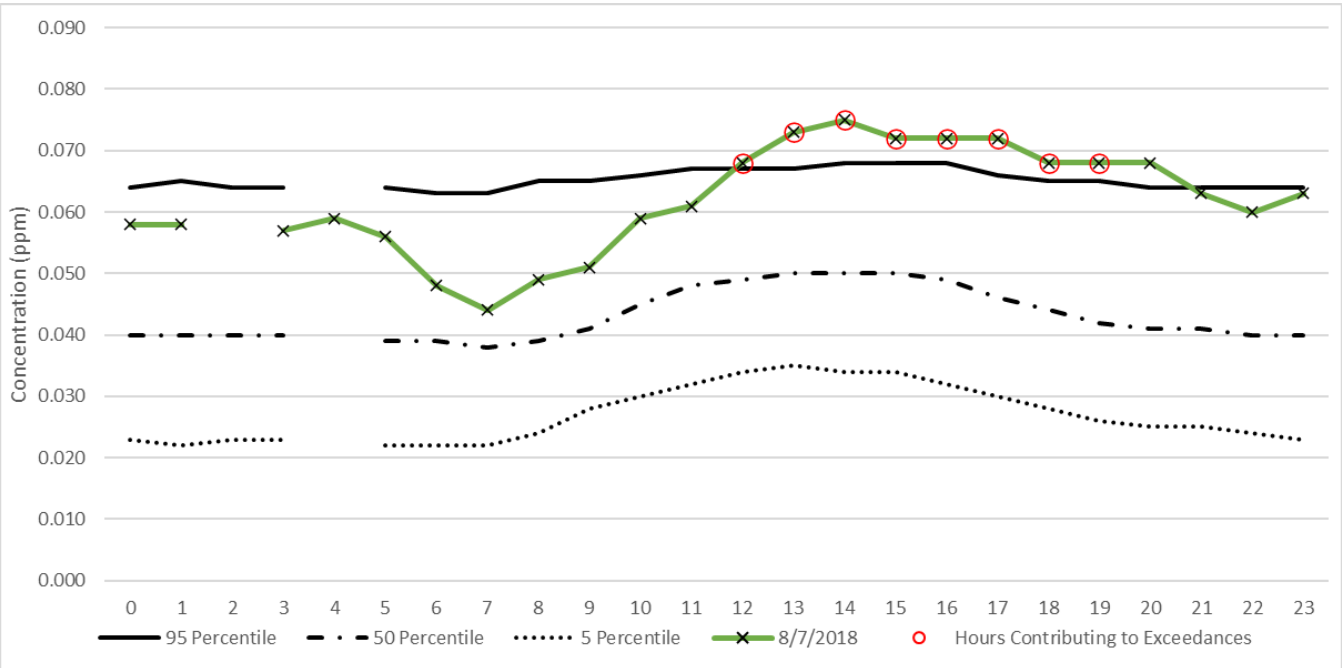


Figure 4-21: Percentiles for Seasonal 1-Hour Ozone for 2013-2017 compared with 8/7/2018



Ample smoke from seven active large wildfires continued blanketing the area during August 8, keeping ozone concentrations elevated throughout the day and reaching a near-exceedance 8-hour concentration of 0.068 ppm (Figure 4-22). During the morning of

August 9, ozone values climbed well above the 95th percentile for eight hours, leading to yet another wildfire influenced exceedance (Figure 4-23).

Figure 4-22: Percentiles for Seasonal 1-Hour Ozone for 2013-2017 compared with 8/8/2018

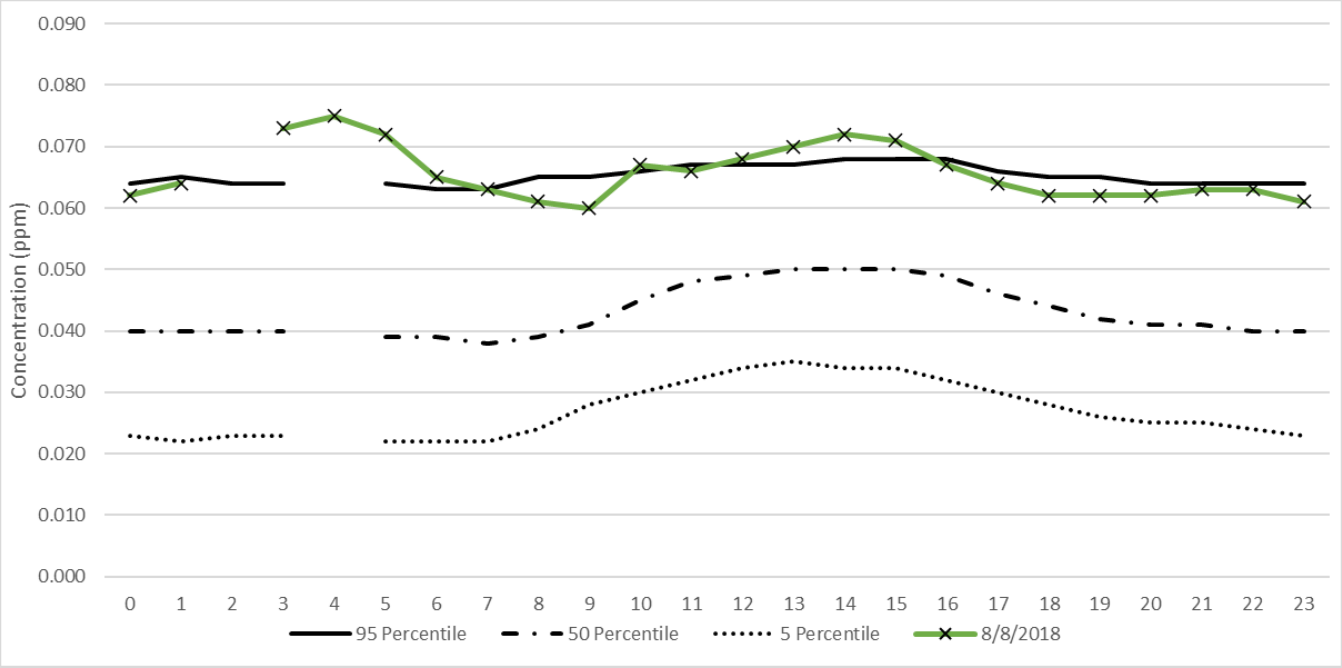


Figure 4-23: Percentiles for Seasonal 1-Hour Ozone for 2013-2017 compared with 8/9/2018

C. Additional Supporting Ground-Level Evidence

1. Air Quality

In addition to an analysis of $PM_{2.5}$ concentrations and transport and ozone diurnal cycles, evidence of ground-level impacts of smoke on the monitor can also be indicated through analysis of carbon monoxide (CO), nitrogen oxide (NO), nitrogen dioxide (NO_2), or ROG, in addition to speciated components. Unfortunately, neither site in the Eastern Portion of San Luis Obispo County nonattainment area measures any of these pollutants. During the time of this event, the South Coast Air Quality Management District operated speciation monitors at several sites throughout the District, but the distance and intervening terrain make this data unusable for this purpose.

2. Area Forecast Discussions

Area Forecast Discussions issued by the Los Angeles/Oxnard (LOX) office of the National Weather Service (NWS) did not note any conditions leading to transport of smoke from other areas of the state in the eastern portion of San Luis Obispo County. The NWS LOX office did, however, issue Air Quality Alerts on August 7, August 8, and August 9, specific to the San Luis Obispo mountains and interior valleys, including the area around the Red Hills Monitor. The first of three Air Quality Alerts is shown in Figure 4-24, with the others included in Appendix III.

Figure 4-24: NWS Air Quality Alert – August 7, 2018, 08:10 PST

```
687
AEUS76 KLOX 071510
AQALOX

Air Quality Alert
Relayed by National Weather Service Los Angeles/Oxnard CA
810 AM PDT Tue Aug 7 2018

CAZ037-051-082100-
San Luis Obispo County Interior Valleys-
San Luis Obispo County Mountains-
Including the cities of Paso Robles, Atascadero, and Black Mountain
810 AM PDT Tue Aug 7 2018

...AIR QUALITY ALERT DUE TO SMOKE IMPACTS FROM WILDFIRES IN EFFECT
UNTIL 2 PM PDT WEDNESDAY...

The San Luis Obispo County Air Pollution Control District has issued
an air quality alert due to smoke impacts in San Luis Obispo County.
Smoke from wildfires is mainly impacting the Eastern and Central
parts of San Luis Obispo County; however, smoke may be intermittently
present in the coastal areas as well.

Exposure to particle pollution can cause serious health problems,
aggravate lung disease, cause asthma attacks and acute bronchitis,
and increase risk of respiratory infections.

Residents are advised to use caution as conditions warrant. People
with heart or lung disease should follow their doctors advice for
dealing with episodes of blowing dust.

Additionally, older adults and children should avoid prolonged
exposure, strenuous activity or heavy exertion, as conditions
dictate.

For the latest air quality forecasts and information, visit the San
Luis Obispo County Air Pollution Control District website at
www.slocleanair.org. or call 805 781 5912

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3. Satellite Smoke Indications

The smoke that enhanced the ozone reaching the Red Hills monitor in early August 2018 were primarily from the increasingly impacted San Joaquin Valley from the smoke filling Northern California. Several tools are available to look at smoke in the areas that impacted Red Hills.

The NOAA Hazard and Mapping System (HMS) Fire and Smoke Product is an analysis of various satellite imagery to map out the scope and even to some extent thickness of smoke layers. These products were extensively utilized in the Narrative Conceptual Model and Clear Causal Relationship chapters of this document.

NOAA Smoke Text Product[46] is a text-based analysis of satellite imagery. These products are used to give an overall view of smoke origins, current locations, and potential transport. The relevant Smoke Text Products issued from August 3 through August 9 are in Appendix V, with two examples shown here. Although neither San Luis Obispo County nor the area are specifically mentioned, Figure 4-25a notes smoke accumulating in the north, particularly the Sacramento Valley, and further south into the San Joaquin Valley, where it was a primary influence at Red Hills. Figure 4-25b makes mention of smoke extending to the Pacific coast (and the North Central Coast Air Basin) and as far south as Baja California.

Figure 4-25: NOAA Smoke Text Products. August 5 and 7, 2018

a. August 5, 2018, 19UTC (11PST)

Sunday, August 5, 2018

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY
THROUGH 1900Z August 5, 2018.

NESDIS IS INVESTIGATING THE UTILITY OF THIS TEXT NARRATIVE. IF YOU FIND
THIS PRODUCT VALUABLE, PLEASE SEND AN EMAIL RESPONSE TO THE FOLLOWING
ADDRESS INDICATING HOW YOU AND/OR YOUR AGENCY USE THE INFORMATION.
THANK YOU. SEND EMAIL RESPONSES TO: SSDFireTeam@noaa.gov.

SMOKE:
Canada...
Scattered fires in central and northwest British Columbia contribute
light-to-moderate density smoke to that region. Individual smoke plumes
are seen moving towards the east. A large area of high level smoke from
previous-day fires extend eastward across central-northern Alberta and
into central Saskatchewan.

Western United States....
Large wildfires continue to burn in northern California and southwest
Oregon releasing heavy density smoke plumes near the source that are
seen accumulating throughout Sacramento and northern San Joaquin valleys
as the smoke travels towards the north-northeast. Higher level smoke
is also seen covering much of northern California, southeast Oregon,
northern Nevada, southeast Idaho and southwest Montana.

[46] NOAA Hazard and Mapping System (HMS), *Fire and Smoke Text Product*, last accessed 7/29/21

b. August 7, 2018, 1802UTC (1002PST)

Tuesday, August 7, 2018

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 1802Z August 7, 2018.

```
NESDIS IS INVESTIGATING THE UTILITY OF THIS TEXT NARRATIVE.  IF YOU FIND
THIS PRODUCT VALUABLE, PLEASE SEND AN EMAIL RESPONSE TO THE FOLLOWING
ADDRESS INDICATING HOW YOU AND/OR YOUR AGENCY USE THE INFORMATION.
THANK YOU.  SEND EMAIL RESPONSES TO: SSDFireTeam@noaa.gov.

SMOKE:
Western and central North America....
Large wildfires from southern, central and northern California and
central Oregon into northern British Columbia continue to burn and emit
thick smoke, contributing to an expansive area of varying density smoke
reaching from the Pacific coast eastward as far as Lake Superior and
offshore west of Baja California.
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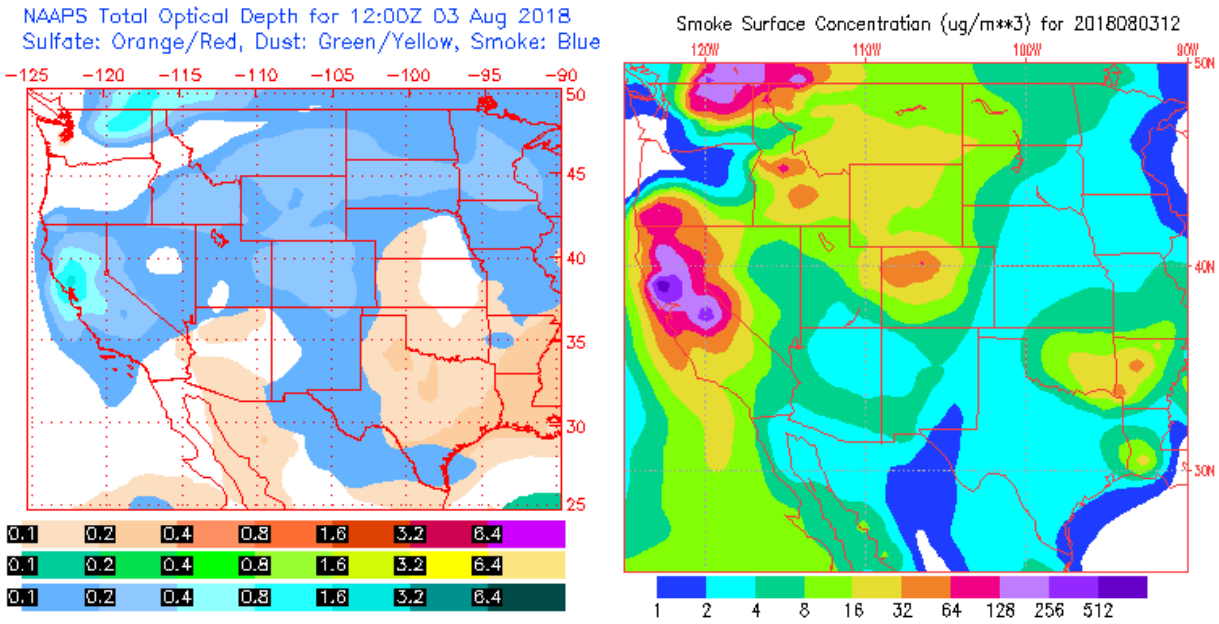
4. NAAPS Global Aerosol Model

The NAAPS (Navy Aerosol Analysis and Prediction System) Global Aerosol Model is used to predict the distribution of tropospheric aerosols using global meteorological fields.[47] The model can provide smoke simulations in near-real-time with up to 120-hour forecasts. Of particular interest are the total optical depth and smoke surface concentration outputs. Aerosol optical depth (AOD) can give us indications of how much aerosol is in the atmosphere, with higher AOD values corresponding with increasing levels of particulate matter. The model can also give a simulation of AOD further broken down into sulfates, dust, and smoke. In addition, the model can also simulate concentrations of smoke at the surface, with darker colors indicating thicker smoke. Figure 4-26 shows the increasing AOD levels and smoke surface concentrations at the Red Hills monitor at the beginning of the event, August 3. Additional AOD and smoke surface concentration model outputs from August 2 through August 9 are shown in Appendix V and show the continued presences of smoke in the eastern San Luis Obispo County area.

[47] Naval Research Laboratory, *Navy Aerosol Analysis and Prediction System (NAAPS) Global Aerosol Model*, last accessed 7/27/21

Figure 4-26: Aerosol Optical Depth and Smoke Surface Concentrations, August 3, 2018



D. Conclusion

In early August 2018, smoke from several large wildfires throughout northern and central California generated emissions that directly resulted in elevated concentrations at the ozone monitor at Red Hills in the Eastern Portion of San Luis Obispo County nonattainment area. Inspection of $PM_{2.5}$ concentrations, satellite-derived smoke layers, and modeled trajectories indicate pathways for the transport of smoke and associated precursors from the wildfires in northern and central California downrange and into the surface boundary layer. This supports the long-range transport of smoke, ozone precursors, and generated ozone that mixed down to the surface at the monitoring site of Red Hills. Additionally, the monitored ozone concentrations during multiple days were above the 95th percentile, and at some points above the 99th percentile, of 1-hour ozone concentrations seen at that site in the previous five summer ozone seasons. The one day during the period that was clear of smoke (August 5) maintained a near normal diurnal ozone pattern, indicating that the lack of wildfire generated emissions was linked with a reduction in ozone concentrations. All requested dates for exceptional events were in the 98th percentile or higher of the prior 5-year distribution of 8-hour ozone data and fall in the top 5 rank for 2018. Area forecast discussions, satellite smoke products, and global aerosol modeling all indicated periods of wildfire smoke aloft and at the surface during the requested event dates.

The comparisons and analyses provided in the Narrative Conceptual Model and Clear Causal Relationship chapters of this demonstration support our conclusion that the numerous wildfire events affected air quality in such a way that there exists a clear causal relationship between the monitoring exceedances or violations as listed in Table I-4 and thus satisfies the clear causal relationship criteria.

Natural Event/Human Activity Unlikely to Recur

The Background and Narrative Conceptual Model chapters of this document provide evidence that the event qualifies as a "Natural Event" as defined in 40 CFR 50.1(k). The fires that impacted the Red Hills ozone monitor in San Luis Obispo County occurred on wildlands that meet the definition in 40 CFR 50.1(n) and (o). When considering fire cause, "wildfires on wildland initiated by accident or arson are considered natural events, and on a case-by-case basis this treatment for wildfires may bear on the appropriate treatment of accidental and arson-set structural fires."[48]

U.S. EPA generally considers the emissions of ozone precursors from wildfires on wildland to meet the regulatory definition of a natural event at 40 CFR 50.1(k), and accordingly, CARB has shown that this event is a natural event and may be considered for treatment as an exceptional event.

Not Reasonably Controllable and/or Not Reasonably Preventable

The Background and Narrative Conceptual Model chapters of this document provide evidence the wildfires impacting the ozone monitor at Red Hills in San Luis Obispo County were natural events predominantly occurring on wildland in California. CARB is not aware of any evidence clearly demonstrating that prevention or control efforts beyond those actually made would have been reasonable. Therefore, emissions from the wildfires were not reasonably controllable or preventable.

Public Notification

As presented in Sections V and VI of the Narrative Conceptual Model chapter, the San Luis Obispo County APCD maintains a public alert system as well as a public information page on their website to keep residents informed of potential wildfire smoke impacts. Examples of the information released to the public is included in Appendix II.

The California Air Resources Board will hold a 30-day public comment period to solicit public input regarding this demonstration. Notification of the public comment period will be posted on the CARB website and emailed to interested stakeholders. Any comments received, and CARB's responses, will be submitted to U.S. EPA at the end of the 30-day public comment period.

Summary/Conclusion

The Mendocino Complex (Ranch and River fires), Natchez, Carr, Donnell, Ferguson, and Turkey Fires in California were the primary focus of these retroactive analyses and discussions, with a lesser look at the additional contributions from the Taylor Creek and Klondike fires in Oregon. These fires were all active producers of wildfire smoke and

[48] 81 FR 68233, Footnote 35

emissions during part or all of early August 2018. These massive wildfires consumed over a million acres of wildlands in California and Oregon while emitting vast amounts of smoke and ozone precursors that were transported across much of northern and central California and into parts of southern California as well.

On August 2, an initial pent-up pool of wildfire smoke and emissions from the Mendocino Complex in northern California began surging southward, continuing along the Coastal Range and reaching the Red Hills monitoring site, causing $PM_{2.5}$ and ozone concentrations to rapidly climb and persist from the late evening of August 3 into August 4. During the evening of August 4 and August 5, conditions shifted, bringing in cleaner air from strong onshore flow across the southern Coastal Range, clearing smoke to the east and allowing $PM_{2.5}$ and ozone concentrations to rapidly decrease and stabilize to near average levels. On the morning of August 6, the Turkey Fire ignited 15 miles north of Red Hills with winds blowing smoke and emissions directly towards the monitoring site, leading to enhanced ozone concentrations. Additionally, daytime on August 6 and August 7 saw additional surges of smoke and emissions from multiple northern fires impacting the Red Hills site, further elevating $PM_{2.5}$ and ozone concentrations. These concentrations continued to be elevated on August 8 and August 9, with a continuing stream of smoke transported southward and resulting in maximum 8-hour ozone concentrations near or above the standard.

This 2018 Red Hills Ozone Exceptional Events Demonstration supports the criteria for an exceptional event as detailed in the 2016 Exceptional Events Rule[49] and Wildfire Ozone Guidance.[50] This documentation used the following evidence to demonstrate the exceptional event:

- Ambient air monitoring data
- HYSPLIT forward dispersion and backward trajectory analyses
- Satellite imagery (both visible and detected products) and narratives
- Wildfire smoke emissions estimates
- Statistical historical concentration comparisons
- Meteorological conditions
- Air Quality District alerts and advisories
- NOAA and HMS smoke products
- Aerosol modeling

This Exceptional Events Demonstration clearly demonstrates justification for exclusion of data for August 3, 4, 6, 7, and 9, 2018 due to an exceptional event under 40 CFR 50.14(c)(3)(iv). The 2018 Red Hills Ozone Exceptional Events Demonstration has provided evidence that:

- Describes the events causing the exceedance and a discussion of how emissions from the event led to the exceedance at the Red Hills monitor;

[49] 81 FR 68216

[50] U.S. EPA, *Final Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations*, p.25, last accessed 7/29/21

- Demonstrates a clear causal relationship between the wildfire emissions and the ozone exceedances at Red Hills on August 3, 4, 6, 7, and 9, 2018;
- Shows that event-influenced concentrations were unusual and above normal historical concentrations;
- Demonstrates the event was neither reasonably controllable nor reasonably preventable; and
- Verifies the event was multiple wildfires, all natural events or human activity that is unlikely to recur at a particular location, all occurring predominantly on wildlands.

Table 8-1: Summary of Demonstration Criteria based on EER Requirements

Demonstration Requirement	Reference	Chapter
Narrative conceptual model	40 CFR 5.014(c)(3)(iv)(A)	3
Clear causal relationship	40 CFR 50.14(c)(3)(iv)(B)	3, 4
Historical analysis	40 CFR 50.14(c)(3)(iv)(C)	2, 3, 4
Human Activity Unlikely to Recur or Natural Event	40 CFR 50.14(c)(3)(iv)(E)	3, 4, 5
Not Reasonably Controllable and Not Reasonably Preventable	40 CFR 50.14(c)(3)(iv)(D)	3, 4, 6

Table 8-2: Summary of Procedural Criteria Based on EER Requirements

Procedural Requirement	Reference	Chapter
Prompt Public Notification	40 CFR 50.14(c)(1)(i)	3, 7, Appendix II
Initial Notification of Potential Exceptional Event Process	40 CFR 50.14(c)(2)(i)	1, Appendix I
Public opportunity to review and comment on demonstration	40 CFR 50.14(c)(3)(v)]	7

CARB recommends that U.S. EPA Region 9 concur with the 2018 Red Hills Ozone Exceptional Events Demonstration and, pending the upcoming 2020 Exceptional Event Demonstration submission including Red Hills, exclude data from the Red Hills Ozone monitor for August 3, 4, 6, 7, and 9, 2018 from comparison to the NAAQS.

References

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Appendices

I. Initial Notification and Air Quality Data

A. Initial Notification

Initial Notification Submitted to U.S. EPA on March 15, 2021. EEPID 665

EE Initial Notification Summary Information O_3 Template

Submitting Agency: San Luis Obispo APCD
Agency Contact: Gary Arcemont
Date Submitted: 11 March 2021
Applicable NAAQS: 2015 8-Hour Ozone
Affected Regulatory Decision[1]: Attainment Determination for 2015 8-Hour Ozone
(for classification decisions, specify level of the classification with/without EE concurrence)
Area Name/Designation Status: Eastern San Luis Obispo County / Marginal
Design Value Period (list three year period): 2018-2020
(where there are multiple relevant design value periods, summarize separately)

A) See attached spreadsheet titled "Federal Exceptional Event Initial Notification Sheet"

B) Violating Sites Information
(listing of all violating sites in the planning area, regardless of operating agency, and regardless of whether or not they are impacted by EEs)

Site/monitor (AQS ID and POC)	Design Value (without EPA concurrence on any of the events listed in attached spreadsheet)	Design Value (with EPA concurrence on all events listed in attached spreadsheet)
Red Hills (060798005-1)	0.073	0.068

C) Summary of Maximum Design Value (DV) Site Information (Effect of EPA Concurrence on Maximum Design Value Site Determination)
(Two highest values from Table B)

Maximum DV site (AQS ID) **without EPA concurrence** on any of the events listed in attached spreadsheet	Design Value 0.073	Design Value Site **Red Hills 060798005**	Comment
Maximum DV site (AQS ID) **with EPA concurrence** on all events listed in attached spreadsheet	Design Value 0.069	Design Value Site **Carissa Plains School 060798006**	Comment **Area meets attainment for 2015 Ozone NAAQS**

D) List of any sites (AQS ID) within planning area with invalid design values (e.g., due to data incompleteness)

[1] designation, classification, attainment determination, attainment date extension, or finding of SIP inadequacy leading to SIP call
[2] Provide additional information for types of event described as "other"

Federal Ozone NAAQS Exceptional Event Initial Notification Sheet

Event Date	Type of Event	AQS Flag	Monitor AQS ID	AQS POC	Site Name	Pollutant	Concentration	Units	Event Name	Notes
Example 7/14/2008	Wildfire	IT	060570005	1	Grass Valley-Litton Building	Ozone-8hr	0.083	ppm	Mendocino Wildfire	Wildfire smoke from Mendocino Wildfire impacted ozone at site. https://www.fire.ca.gov/incidents/2018/7/27/ranch-fire-mendocino-complex/
8/3/2018	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.073	ppm	Multiple Fires	Wildfire smoke from River, Ranch, Carr, Donnell, and Ferguson Wildfires
8/4/2018	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.072	ppm	Multiple Fires	Wildfire smoke from River, Ranch, Carr, Donnell, and Ferguson Wildfires
8/6/2018	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.071	ppm	Multiple Fires	Wildfire smoke from Turkey, River, Ranch, Carr, Donnell, and Ferguson Wildfires
8/7/2018	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.071	ppm	Multiple Fires	Wildfire smoke from Turkey, River, Ranch, Carr, Donnell, and Ferguson Wildfires
8/9/2018	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.073	ppm	Multiple Fires	Wildfire smoke from River, Ranch, Carr, Donnell, and Ferguson Wildfires
8/18/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.073	ppm	Multiple Fires	Wildfire smoke from Lake, River, CZU Lightning Complex, SCU Lightning Complex, LNU Lightning Complex, August Complex, SQF Complex, North Complex
8/20/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.076	ppm	Multiple Fires	Wildfire smoke from Lake, River, CZU Lightning Complex, SCU Lightning Complex, LNU Lightning Complex, August Complex, SQF Complex, North Complex
8/21/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.106	ppm	Multiple Fires	Wildfire smoke from Lake, River, CZU Lightning Complex, SCU Lightning Complex, LNU Lightning Complex, August Complex, SQF Complex, North Complex
8/22/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.073	ppm	Multiple Fires	Wildfire smoke from Lake, River, CZU Lightning Complex, SCU Lightning Complex, LNU Lightning Complex, August Complex, SQF Complex, North Complex
9/2/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.074	ppm	Multiple Fires	Wildfire smoke from Lake, River, CZU Lightning Complex, SCU Lightning Complex, LNU Lightning Complex, August Complex, SQF Complex, North Complex
9/3/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.071	ppm	Multiple Fires	Wildfire smoke from Lake, River, CZU Lightning Complex, SCU Lightning Complex, LNU Lightning Complex, August Complex, SQF Complex, North Complex
9/5/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.076	ppm	Multiple Fires	Wildfire smoke from Lake, CZU Lightning Complex, SCU Lightning Complex, LNU Lightning Complex, August Complex, SQF Complex, Creek, North Complex
9/6/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.076	ppm	Multiple Fires	Wildfire smoke from Lake, CZU Lightning Complex, SCU Lightning Complex, LNU Lightning Complex, August Complex, SQF Complex, Creek, Bobcat, North Complex
9/12/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.070	ppm	Multiple Fires	Wildfire smoke from Lake, CZU Lightning Complex, SCU Lightning Complex, LNU Lightning Complex, August Complex, SQF Complex, Creek, Bobcat, North Complex
9/14/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.071	ppm	Multiple Fires	Wildfire smoke from Lake, CZU Lightning Complex, SCU Lightning Complex, LNU Lightning Complex, August Complex, SQF Complex, Creek, Bobcat, North Complex
9/15/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.072	ppm	Multiple Fires	Wildfire smoke from Lake, CZU Lightning Complex, SCU Lightning Complex, LNU Lightning Complex, August Complex, SQF Complex, Creek, Bobcat, North Complex
9/16/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.080	ppm	Multiple Fires	Wildfire smoke from Lake, CZU Lightning Complex, SCU Lightning Complex, LNU Lightning Complex, August Complex, SQF Complex, Creek, Bobcat, North Complex
9/17/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.072	ppm	Multiple Fires	Wildfire smoke from Lake, CZU Lightning Complex, SCU Lightning Complex, LNU Lightning Complex, August Complex, SQF Complex, Creek, Bobcat, North Complex
9/29/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.072	ppm	Multiple Fires	Wildfire smoke from SCU Lightning Complex, LNU Lightning Complex, August Complex, SQF Complex, Creek, Bobcat, North Complex
9/30/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.075	ppm	Multiple Fires	Wildfire smoke from SCU Lightning Complex, LNU Lightning Complex, August Complex, SQF Complex, Creek, Bobcat, North Complex
10/1/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.081	ppm	Multiple Fires	Wildfire smoke from LNU Lightning Complex, August Complex, SQF Complex, Creek, Bobcat, North Complex
10/2/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.081	ppm	Multiple Fires	Wildfire smoke from August Complex, SQF Complex, Creek, Bobcat, North Complex
10/3/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.071	ppm	Multiple Fires	Wildfire smoke from August Complex, SQF Complex, Creek, Bobcat, North Complex
10/4/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.070	ppm	Multiple Fires	Wildfire smoke from August Complex, SQF Complex, Creek, Bobcat, North Complex
10/6/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.073	ppm	Multiple Fires	Wildfire smoke from August Complex, SQF Complex, Creek, Bobcat, North Complex
10/16/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.072	ppm	Multiple Fires	Wildfire smoke from August Complex, SQF Complex, Creek, Bobcat, North Complex
10/17/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.074	ppm	Multiple Fires	Wildfire smoke from August Complex, SQF Complex, Creek, Bobcat, North Complex
10/31/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.072	ppm	Multiple Fires	Wildfire smoke from August Complex, SQF Complex, Creek, Bobcat, North Complex
11/1/2020	Wildfire	IT	060798005	1	Red Hills	Ozone-8hr	0.074	ppm	Multiple Fires	Wildfire smoke from August Complex, SQF Complex, Creek, Bobcat, North Complex

B. AQS AMP350 Data

Data is currently flagged with the REQEXC Code “rt-Wildfire-U.S.”

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
RAW DATA REPORT

Aug. 20, 2021

(44201) Ozone

SITE ID: 06-079-8005 POC: 1
COUNTY: (079) San Luis Obispo
CITY: (00000) Not in a city
SITE ADDRESS: 3601 GILLIS CANYON ROAD
SITE COMMENTS:
MONITOR COMMENTS:

STATE: (06) California
AQCR: (032) SOUTH CENTRAL COAST
URBANIZED AREA: (0000) NOT IN AN URBAN AREA
LAND USE: AGRICULTURAL
LOCATION SETTING: RURAL

CAS NUMBER: 10028-15-6
LATITUDE: 35.64368
LONGITUDE: -120.23135
UTM ZONE:
UTM NORTHING:
UTM EASTING:
ELEVATION-MSL: 712
PROBE HEIGHT: 4.7

SUPPORT AGENCY: (0946) San Luis Obispo County APCD
MONITOR TYPE: SLAMS
COLLECTION AND ANALYSIS METHOD: (087) INSTRUMENTAL ULTRA VIOLET ABSORPTI
PQAO: (0145) California Air Resources Board

REPORT FOR: AUGUST 2018

DURATION: 1 HOUR
UNITS: Parts per million
MIN DETECTABLE: .005

	HOUR																								
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MAXIMUM
1	.048	.046	BF	.043	.044	.044	.043	.039	.043	.045	.047	.050	.052	.054	.053	.051	.050	.047	.045	.044	.045	.047	.044	.042	23	.054
2	.044	.043	BF	.042	.042	.042	.038	.040	.039	.044	.045	.049	.053	.054	.050	.050	.045	.044	.043	.040	.038	.035	.034	.039	23	.054
3	.038rt	.039rt	BF	.038rt	.038rt	.038rt	.040rt	.036rt	AV	AV	AV	AV	.058rt	.058rt	.059rt	.060rt	.062rt	.062rt	.060rt	.059rt	.058rt	.057rt	.062rt	.070rt	19	.070
4	.067rt	.073rt	BF	.076rt	.077rt	.076rt	.077rt	.074rt	.070rt	.069rt	.068rt	.067rt	.071rt	.073rt	.072rt	.073rt	.072rt	.078rt	.072rt	.072rt	.070rt	.045rt	.039rt	.032rt	23	.078
5	.033	.031	BF	.033	.034	.036	.036	.031	.035	.038	.038	.040	.042	.045	.046	.045	.046	.047	.043	.040	.041	.044	.046	.033	23	.047
6	.044rt	.053rt	BF	.047rt	.044rt	.043rt	.040rt	.039rt	.046rt	.054rt	.053rt	.052rt	.054rt	.059rt	.069rt	.074rt	.076rt	.081rt	.076rt	.068rt	.066rt	.064rt	.060rt	.042rt	23	.081
7	.058rt	.058rt	BF	.057rt	.059rt	.056rt	.048rt	.044rt	.049rt	.051rt	.059rt	.061rt	.068rt	.073rt	.075rt	.072rt	.072rt	.072rt	.068rt	.068rt	.068rt	.063rt	.060rt	.063rt	23	.075
8	.062	.064	BF	.073	.075	.072	.065	.063	.061	.060	.067	.066	.068	.070	.072	.071	.067	.064	.062	.062	.062	.063	.063	.061	23	.075
9	.062rt	.063rt	BF	.060rt	.060rt	.071rt	.073rt	.074rt	.072rt	.074rt	.076rt	.076rt	.074rt	.073rt	.072rt	.071rt	.072rt	.064rt	.060rt	.060rt	.059rt	.063rt	.063rt	.063rt	23	.076
10	.059	.058	BF	.062	.059	.058	.058	.056	.051	.048	.049	.051	.054	.054	.050	.048	.047	.048	.046	.040	.039	.042	.044	.045	23	.062
11	.044	.040	BF	.038	.043	.043	.042	.038	.038	.040	.042	.044	.048	.049	.051	.050	.044	.042	.042	.039	.035	.033	.031	.033	23	.051
12	.035	.037	BF	.035	.036	.036	.036	.032	.032	.032	.037	.039	.042	.042	.039	.038	.038	.039	.035	.033	.034	.034	.034	.034	23	.042
13	.035	.034	BF	.034	.034	.034	.034	.036	.037	.037	.036	.039	.042	.042	.043	.043	.040	.040	.037	.034	.032	.035	.035	.040	23	.043
14	.039	.035	BF	.038	.036	.037	.036	.031	.031	.034	.042	.048	.053	.055	.055	.049	.050	.049	.042	.039	.037	.037	.037	.040	23	.055
15	.043	.043	BF	.040	.041	.042	.038	.031	.034	.039	.043	.046	.050	.054	.058	.060	.055	.052	.043	.042	.043	.045	.049	.051	23	.060
16	.051	.051	BF	.048	.054	.049	.047	.046	.038	.042	.047	.050	.055	.059	.058	.058	.053	.053	.049	.045	.045	.042	.043	.044	23	.059
17	.045	.050	BF	.046	.052	.054	.056	.058	.059	.058	.060	.060	.059	.058	.059	.059	.059	.052	.037	.036	.036	.036	.035	.039	23	.060
18	.040	.041	BF	.055	.053	.055	.056	.049	.048	.043	.048	.049	.046	.044	.050	.045	.037	.032	.034	.042	.053	.057	.056	.059	23	.059
19	.062	.060	BF	.062	.062	.061	.065	.063	.062	.060	.057	.052	.049	.048	.051	.049	.043	.039	.045	.049	.048	.043	.042	.044	23	.065
20	.048	.051	BF	.051	.050	.049	.050	.048	.044	.047	.046	.048	.049	.048	.048	.046	.047	.047	.047	.042	.043	.043	.042	.044	23	.051
21	.044	.038	BF	.040	.039	.039	.038	.029	.032	.033	.035	.038	.043	.046	.047	.046	.045	.045	.044	.043	.041	.040	.043	.040	23	.047
22	.040	.037	BF	.042	.045	.048	.044	.033	.030	.032	.037	.044	.044	.045	.046	.046	.047	.050	.043	.040	.038	.039	.044	.043	23	.050
23	.041	.039	BF	.045	.045	.045	.043	.037	.034	.034	.040	.047	.047	.048	.046	.046	.044	.044	.045	.047	.047	.044	.043	.042	23	.048
24	.046	.048	BF	.047	.046	.044	.040	.037	.036	.037	.047	.049	.054	.060	.060	.057	.061	.062	.059	.060	.064	.054	.053	.053	23	.064
25	.057	.054	BF	.054	.059	.063	.068	.065	.070	.069	.060	.058	.060	.060	.056	.062	.063	.061	.056	.054	.052	.054	.048	.046	23	.070
26	.039	.044	BF	.054	.057	.055	.051	.033	.034	.041	.045	.048	.057	.051	.057	.054	.052	.045	.043	.042	.042	.042	.042	.038	23	.057
27	.036	.035	BF	.040	.042	.041	.038	.025	.026	BC	BC	.031	.034	.036	.040	.039	.035	.033	.029	.027	.026	.026	.027	.026	21	.042
28	.024	.021	BF	.023	.023	.023	.020	.020	.022	.025	.029	.034	.037	.040	.035	.034	.033	.031	.029	.026	.025	.024	.023	.022	23	.040
29	.022	.022	BF	.019	.020	.019	.020	.021	.024	.026	.028	.034	.034	.036	.042	.039	.041	.040	.037	.033	.032	.030	.031	.030	23	.042
30	.030	.029	BF	.027	.027	.026	.025	.025	.029	.036	.035	.038	.041	.044	.046	.048	.048	.049	.048	.048	.046	.042	.048	.045	23	.049
31	.044	.039	BF	.036	.037	.042	.045	.046	.044	.050	.053	.051	.053	.055	.058	.059	.060	.059	.056	.056	.058	.059	.057	.057	23	.060
NO.:	31	31		31	31	31	31	31	30	29	29	30	31	31	31	31	31	31	31	31	31	31	31	31		
MAX:	.067	.073		.076	.077	.076	.077	.074	.072	.074	.076	.076	.074	.073	.075	.074	.076	.081	.076	.072	.070	.064	.063	.070		
AVG:	.0445	.0444		.0453	.0462	.0465	.0455	.0419	.0423	.0448	.0472	.0486	.0513	.0527	.0536	.0530	.0517	.0507	.0476	.0461	.0459	.0446	.0445	.0439		

MONTHLY OBSERVATIONS: 707 MONTHLY MEAN: .0471 MONTHLY MAX: .081

Note: Qualifier codes with regional concurrence are shown in upper case, and those without regional review are shown in lower case. An asterisk ("*") indicates that the region has reviewed the value and does not concur with the qualifier.

II. District Alerts/Advisories

A. Better Breather Alert

SLO COUNTY apcd | Air Pollution Control District
San Luis Obispo County

FOR IMMEDIATE RELEASE: July 30, 2018

Contact: **Meghan Field, 805-781-5912**
SLO County Air Pollution Control District

Dr. Penny Borenstein, 805-781-5500
SLO County Public Health Department

BETTER BREATHER ALERT - SMOKE IMPACTING SAN LUIS OBISPO COUNTY

SAN LUIS OBISPO, CALIFORNIA, – The San Luis Obispo (SLO) County Air Pollution Control District and County Health Department informs individuals that air quality in San Luis Obispo County is being impacted by smoke from wildfires. As of 2 p.m. Monday, July 30, smoke impacts are the greatest in Eastern and Central San Luis Obispo County (including Paso Robles and Atascadero) and air quality is mostly good along the coast (including San Luis Obispo), but coastal air quality could deteriorate as the smoke plume spreads. Expect skies to be hazy and fine particulate ($PM_{2.5}$) and ozone concentrations to be higher than normal. Changing winds make it difficult to predict which areas of the county may be most affected as the week progresses. However, until the fires are put out, smoke will likely be intermittently present in our region.

If you smell smoke or see ash fall, County officials recommend you take precautions and use common sense to reduce the harmful health effects associated with smoke exposure. When it is obvious that smoke is in the air, individuals should avoid strenuous outdoor activity and remain indoors as much as possible. These precautions are especially important for people with existing respiratory illness and heart conditions, as they are particularly vulnerable to the health effects of declining air quality. If smoke impacts increase, healthy people could be affected as well. If a cough, shortness of breath, wheezing, exhaustion, light-headedness or chest pain occurs, outdoor activity should be stopped immediately, and the affected person should seek medical attention. More information can be found at slocleanair.org/air-quality/wildfire.

To clean ash, please do the following: use a damp cloth and spray areas lightly with water, directing ash-filled water to ground areas, and away from the runoff system; take your vehicle to the car wash; wash off toys that have been outside in the ash; clean ash off pets; due to the corrosive nature of ash, avoid any skin contact with the ash (wear gloves, long-sleeved shirts); and do not use leaf blowers. Please note, if you have existing heart or lung conditions, avoid doing ash clean-up yourself or anything else that stirs the particles back up into the air. In addition, do not allow children to play in the ash.

APCD and County officials will continue to closely monitor smoke impacts and air quality in San Luis Obispo County. By following the air quality index (AQI), the public can also monitor real-time air quality throughout SLO County. The AQI focuses on health effects individuals may experience within a few hours or days after breathing polluted air. The current and forecasted AQI is available via the APCD website: slocleanair.org. Sign up to receive the daily AQI air quality forecast via email by subscribing online at enviroflash.info, sign up for our AirAware text notifications and check our Twitter feed for the latest updates (@slocleanair).

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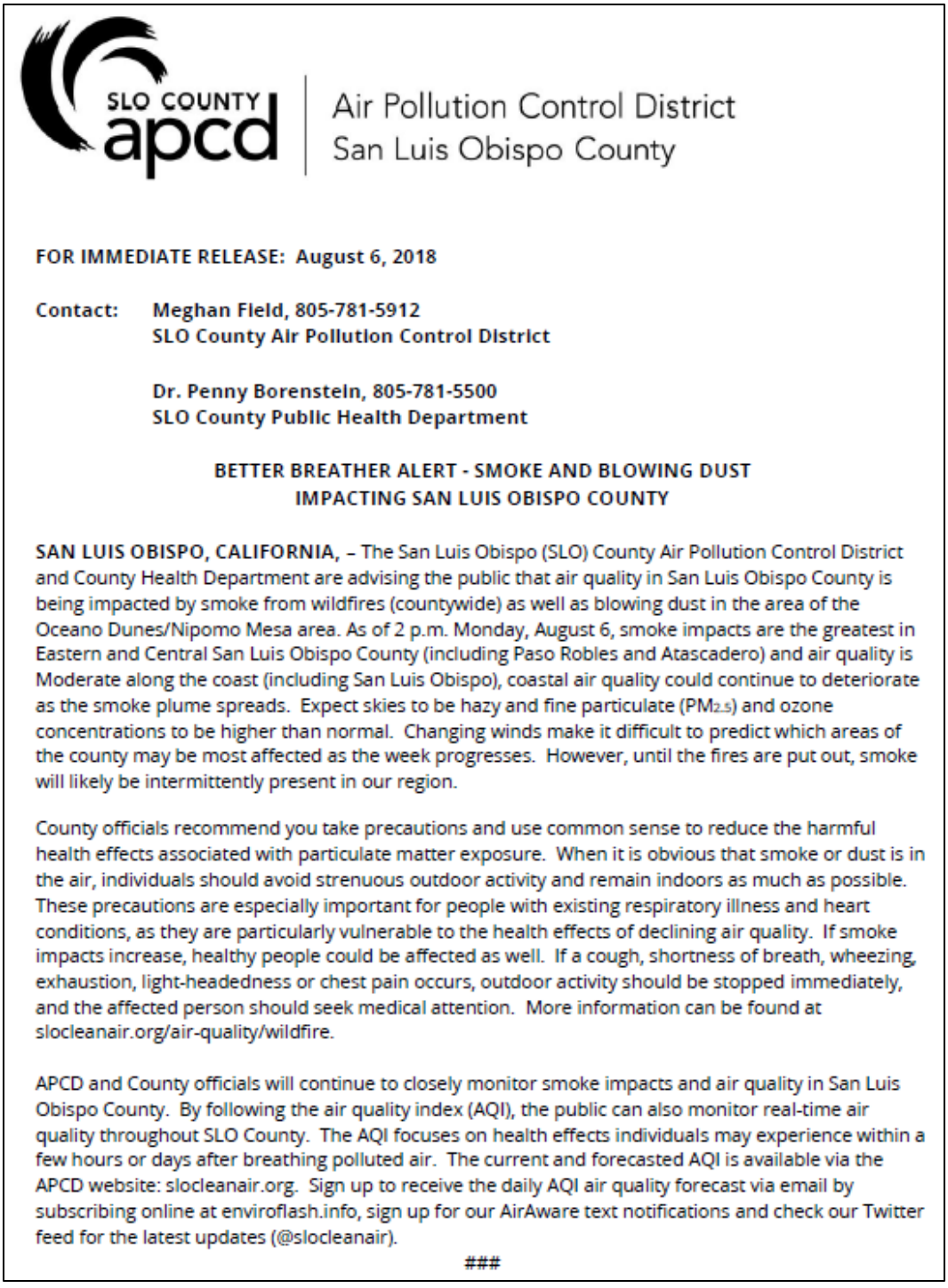
Better Breather Alert, July 20, 2018



SLO COUNTY apcd | Air Pollution Control District
San Luis Obispo County

FOR IMMEDIATE RELEASE: August 6, 2018

Contact: **Meghan Field, 805-781-5912**
SLO County Air Pollution Control District

Dr. Penny Borenstein, 805-781-5500
SLO County Public Health Department

BETTER BREATHER ALERT - SMOKE AND BLOWING DUST IMPACTING SAN LUIS OBISPO COUNTY

SAN LUIS OBISPO, CALIFORNIA, – The San Luis Obispo (SLO) County Air Pollution Control District and County Health Department are advising the public that air quality in San Luis Obispo County is being impacted by smoke from wildfires (countywide) as well as blowing dust in the area of the Oceano Dunes/Nipomo Mesa area. As of 2 p.m. Monday, August 6, smoke impacts are the greatest in Eastern and Central San Luis Obispo County (including Paso Robles and Atascadero) and air quality is Moderate along the coast (including San Luis Obispo), coastal air quality could continue to deteriorate as the smoke plume spreads. Expect skies to be hazy and fine particulate ($PM_{2.5}$) and ozone concentrations to be higher than normal. Changing winds make it difficult to predict which areas of the county may be most affected as the week progresses. However, until the fires are put out, smoke will likely be intermittently present in our region.

County officials recommend you take precautions and use common sense to reduce the harmful health effects associated with particulate matter exposure. When it is obvious that smoke or dust is in the air, individuals should avoid strenuous outdoor activity and remain indoors as much as possible. These precautions are especially important for people with existing respiratory illness and heart conditions, as they are particularly vulnerable to the health effects of declining air quality. If smoke impacts increase, healthy people could be affected as well. If a cough, shortness of breath, wheezing, exhaustion, light-headedness or chest pain occurs, outdoor activity should be stopped immediately, and the affected person should seek medical attention. More information can be found at slocleanair.org/air-quality/wildfire.

APCD and County officials will continue to closely monitor smoke impacts and air quality in San Luis Obispo County. By following the air quality index (AQI), the public can also monitor real-time air quality throughout SLO County. The AQI focuses on health effects individuals may experience within a few hours or days after breathing polluted air. The current and forecasted AQI is available via the APCD website: slocleanair.org. Sign up to receive the daily AQI air quality forecast via email by subscribing online at enviroflash.info, sign up for our AirAware text notifications and check our Twitter feed for the latest updates (@slocleanair).

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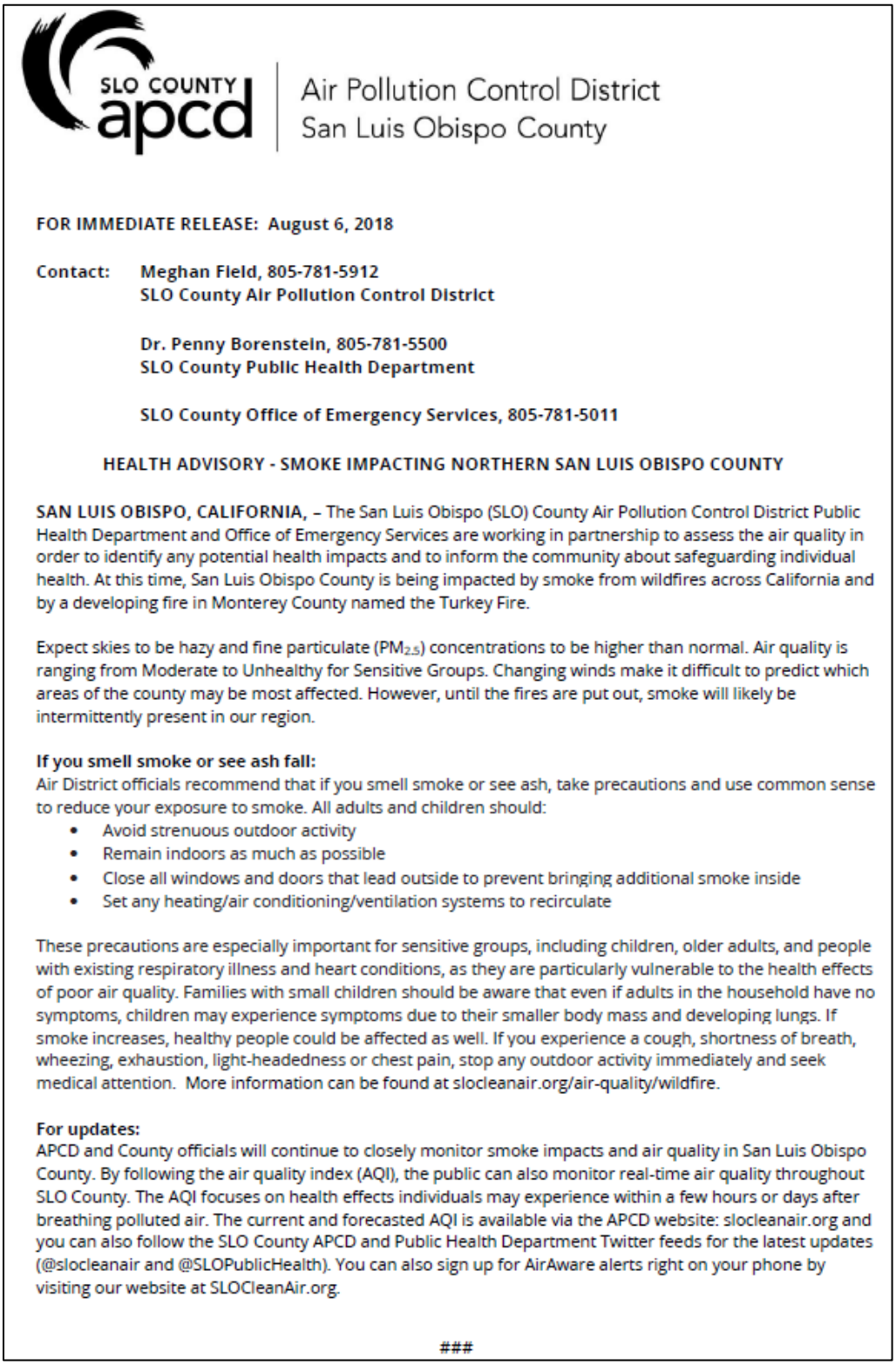
Better Breather Alert, August 6, 2018

B. Health Advisory



SLO COUNTY apcd | Air Pollution Control District
San Luis Obispo County

FOR IMMEDIATE RELEASE: August 6, 2018

Contact: **Meghan Field, 805-781-5912**
SLO County Air Pollution Control District

Dr. Penny Borenstein, 805-781-5500
SLO County Public Health Department

SLO County Office of Emergency Services, 805-781-5011

HEALTH ADVISORY - SMOKE IMPACTING NORTHERN SAN LUIS OBISPO COUNTY

SAN LUIS OBISPO, CALIFORNIA, – The San Luis Obispo (SLO) County Air Pollution Control District Public Health Department and Office of Emergency Services are working in partnership to assess the air quality in order to identify any potential health impacts and to inform the community about safeguarding individual health. At this time, San Luis Obispo County is being impacted by smoke from wildfires across California and by a developing fire in Monterey County named the Turkey Fire.

Expect skies to be hazy and fine particulate ($PM_{2.5}$) concentrations to be higher than normal. Air quality is ranging from Moderate to Unhealthy for Sensitive Groups. Changing winds make it difficult to predict which areas of the county may be most affected. However, until the fires are put out, smoke will likely be intermittently present in our region.

If you smell smoke or see ash fall:
Air District officials recommend that if you smell smoke or see ash, take precautions and use common sense to reduce your exposure to smoke. All adults and children should:

- Avoid strenuous outdoor activity
- Remain indoors as much as possible
- Close all windows and doors that lead outside to prevent bringing additional smoke inside
- Set any heating/air conditioning/ventilation systems to recirculate

These precautions are especially important for sensitive groups, including children, older adults, and people with existing respiratory illness and heart conditions, as they are particularly vulnerable to the health effects of poor air quality. Families with small children should be aware that even if adults in the household have no symptoms, children may experience symptoms due to their smaller body mass and developing lungs. If smoke increases, healthy people could be affected as well. If you experience a cough, shortness of breath, wheezing, exhaustion, light-headedness or chest pain, stop any outdoor activity immediately and seek medical attention. More information can be found at slocleanair.org/air-quality/wildfire.

For updates:
APCD and County officials will continue to closely monitor smoke impacts and air quality in San Luis Obispo County. By following the air quality index (AQI), the public can also monitor real-time air quality throughout SLO County. The AQI focuses on health effects individuals may experience within a few hours or days after breathing polluted air. The current and forecasted AQI is available via the APCD website: slocleanair.org and you can also follow the SLO County APCD and Public Health Department Twitter feeds for the latest updates (@slocleanair and @SLOPublicHealth). You can also sign up for AirAware alerts right on your phone by visiting our website at SLOCleanAir.org.

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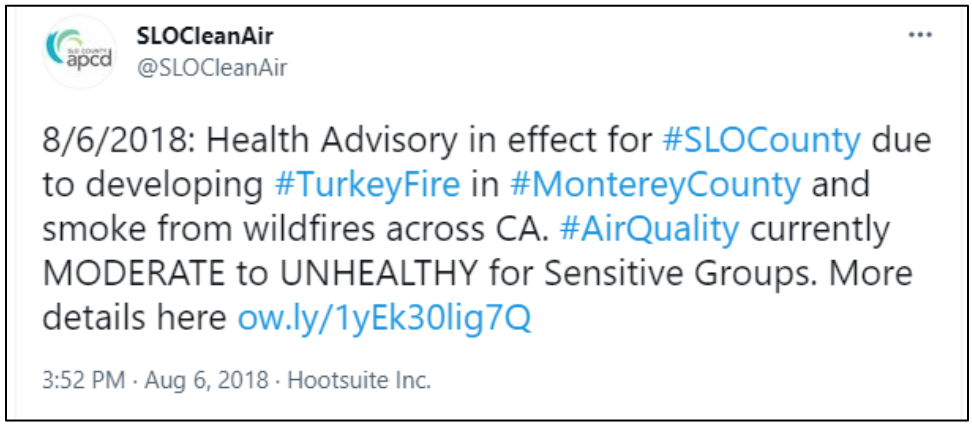
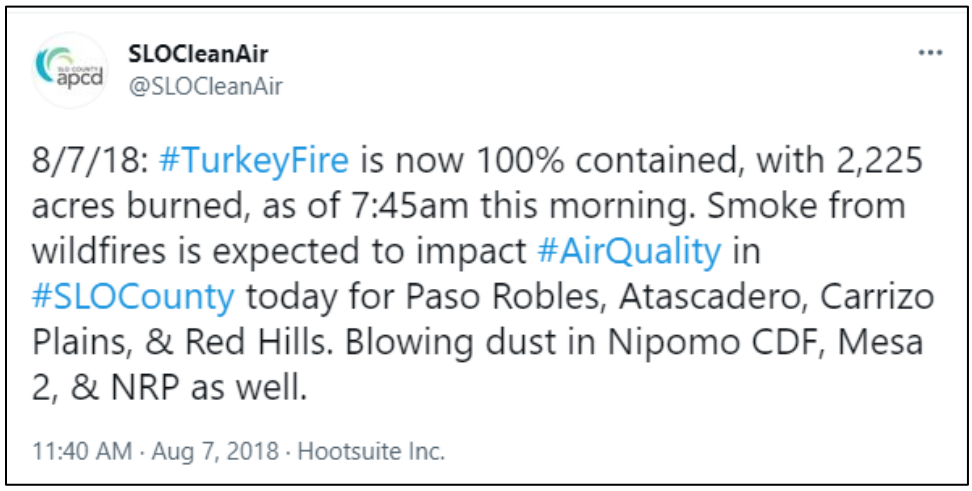
Health Advisory, August 6, 2018

C. Twitter Posts

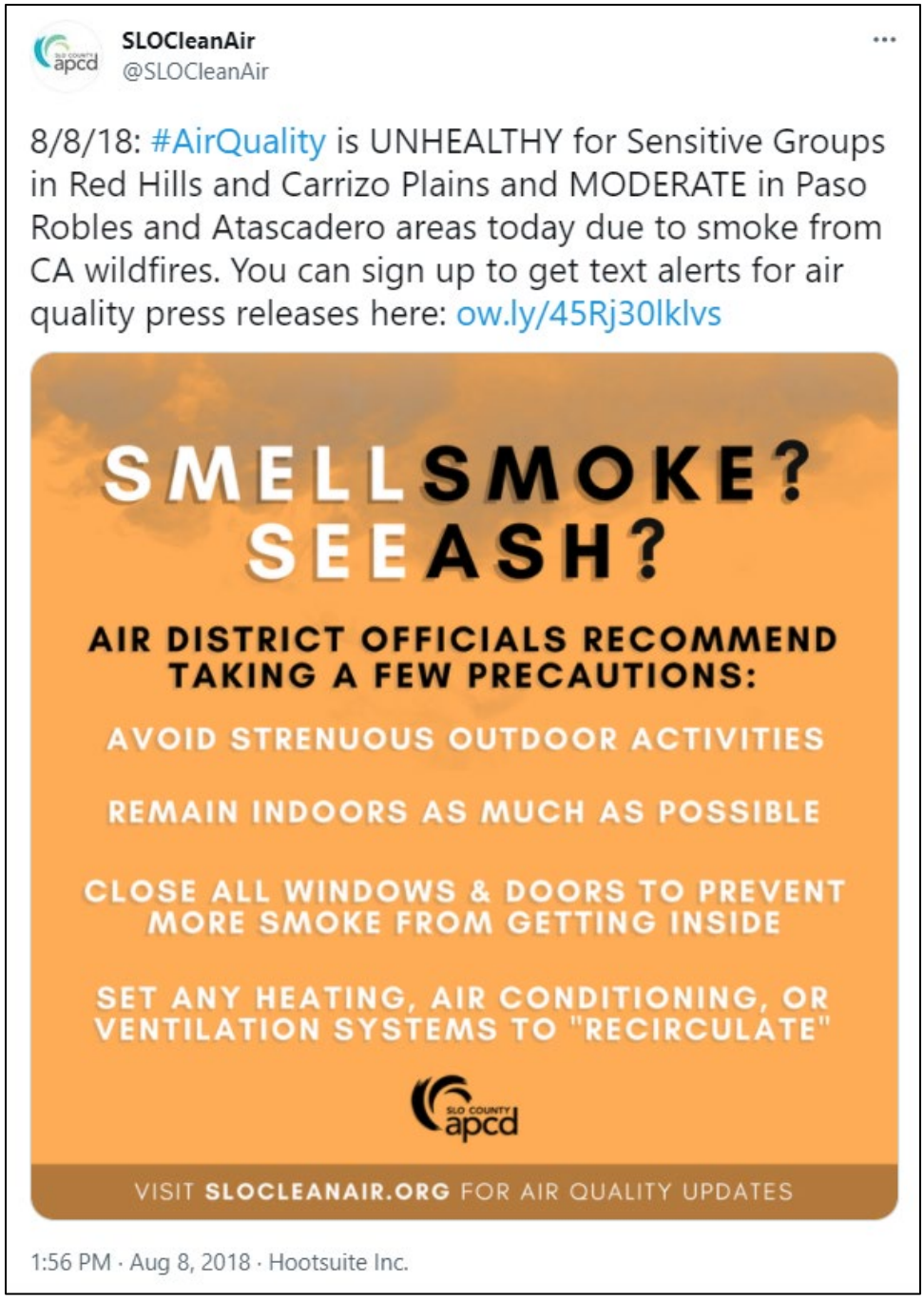


SLOCleanAir, *August 6, 2018*



SLOCleanAir, *August 7, 2018*

SLOCleanAir, *August 8, 2018*

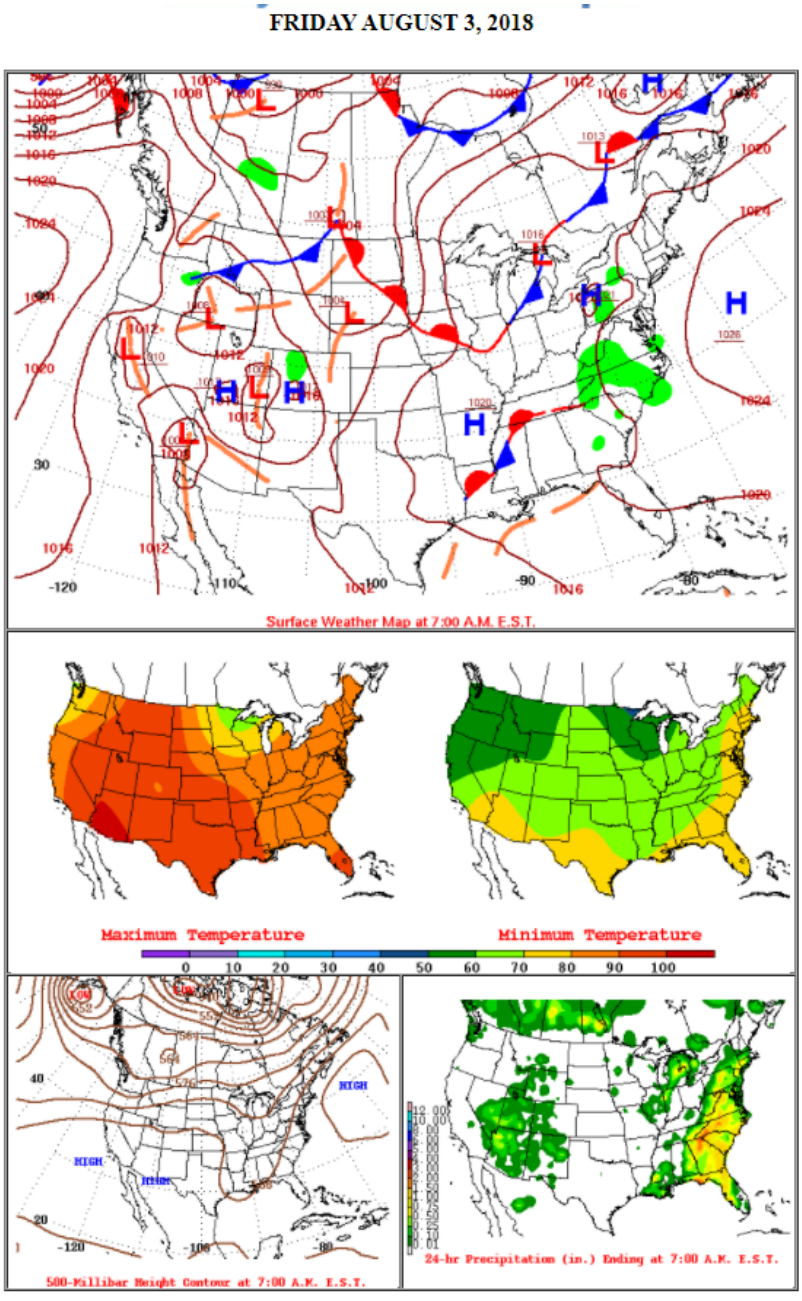


SLOCleanAir, *August 8, 2018*

III. Meteorological Information

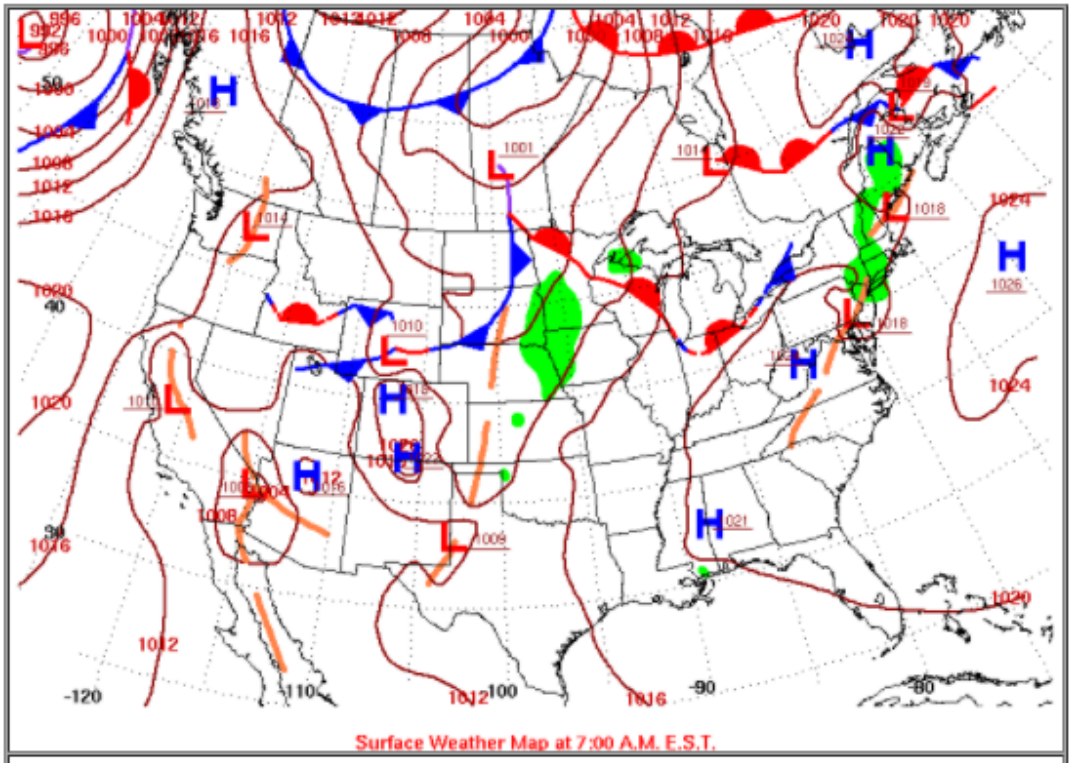
A. NWS Daily Maps[51]

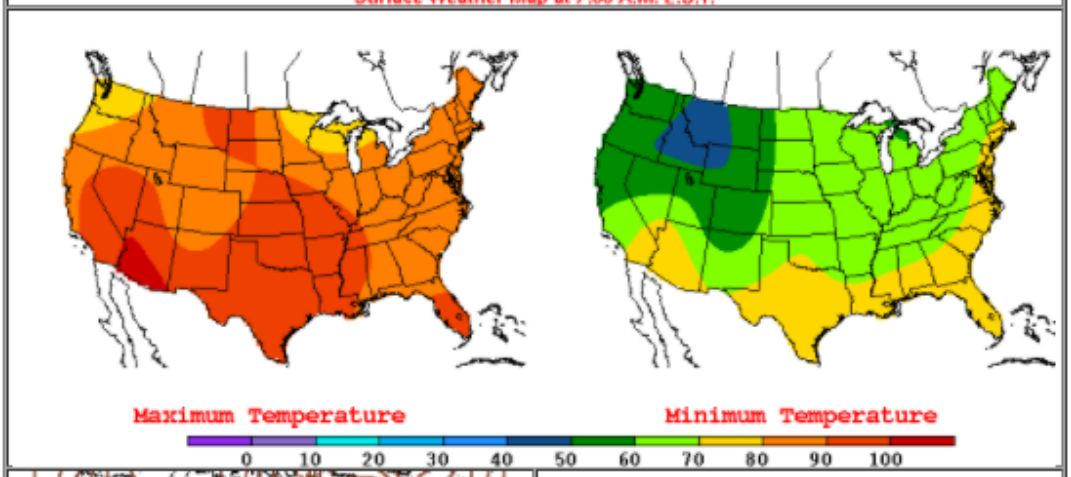
National Weather Service daily surface and upper atmosphere maps from August 3, 2018 to August 9, 2018 showing conditions on each day of the event. Temperature and precipitation maps indicate hot, dry conditions, which resulted in ideal conditions for wildfire ignition and development.

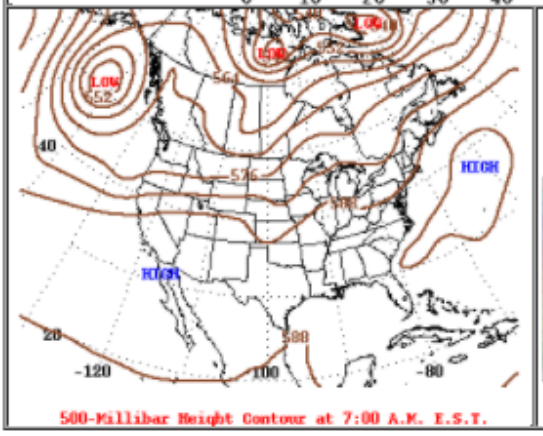


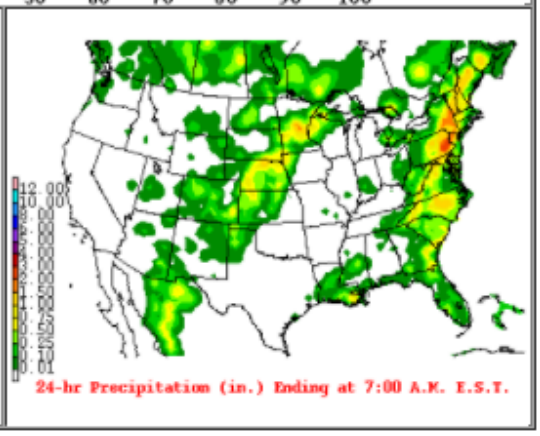
[51] NWS, *Daily Weather Maps*, last accessed 7/29/21

SATURDAY AUGUST 4, 2018

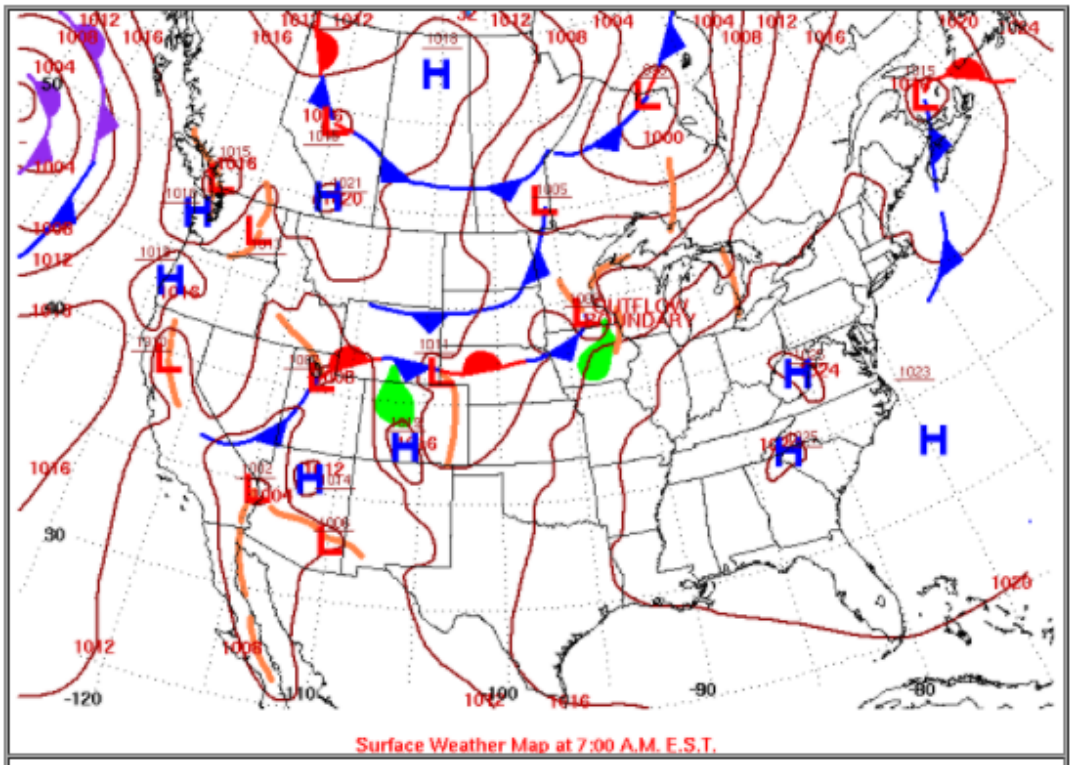


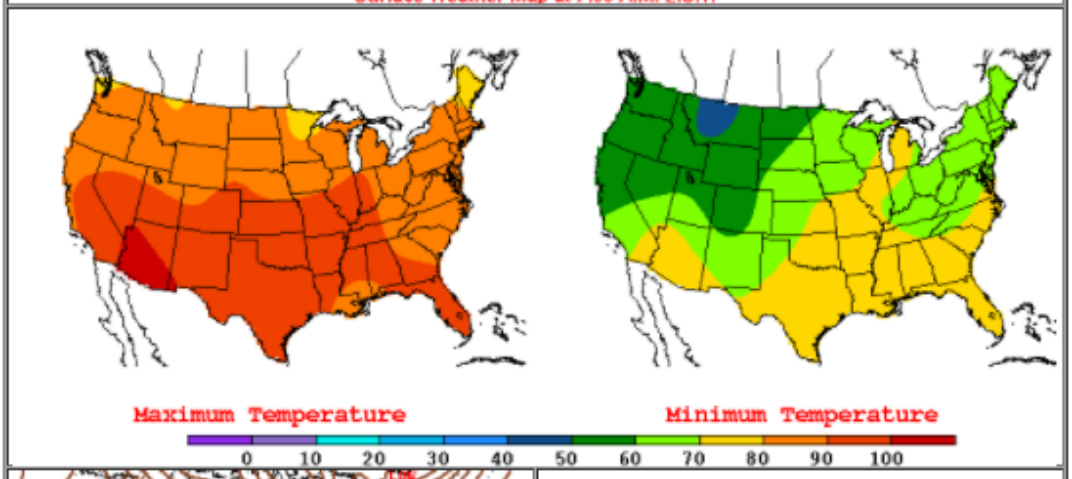


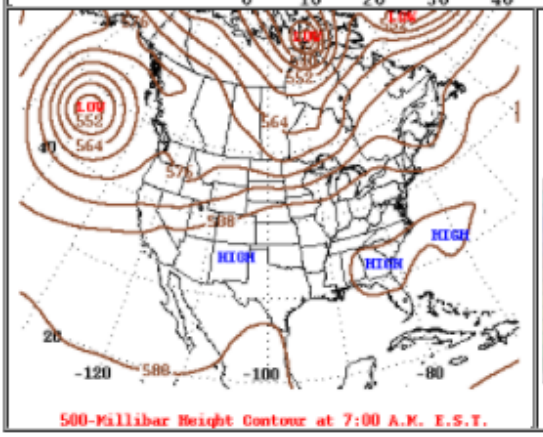


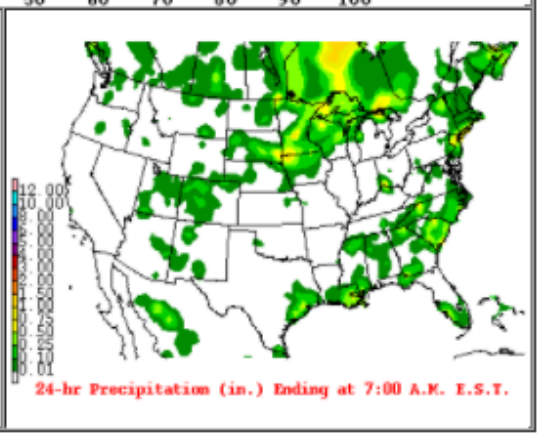


SUNDAY AUGUST 5, 2018

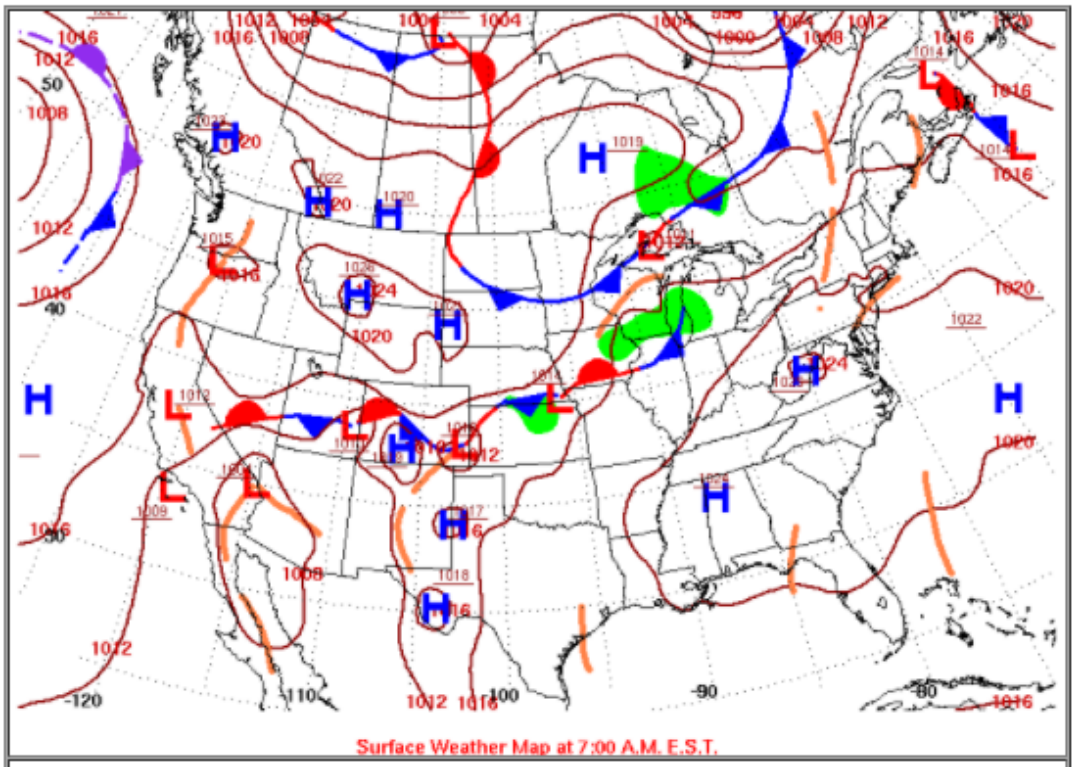


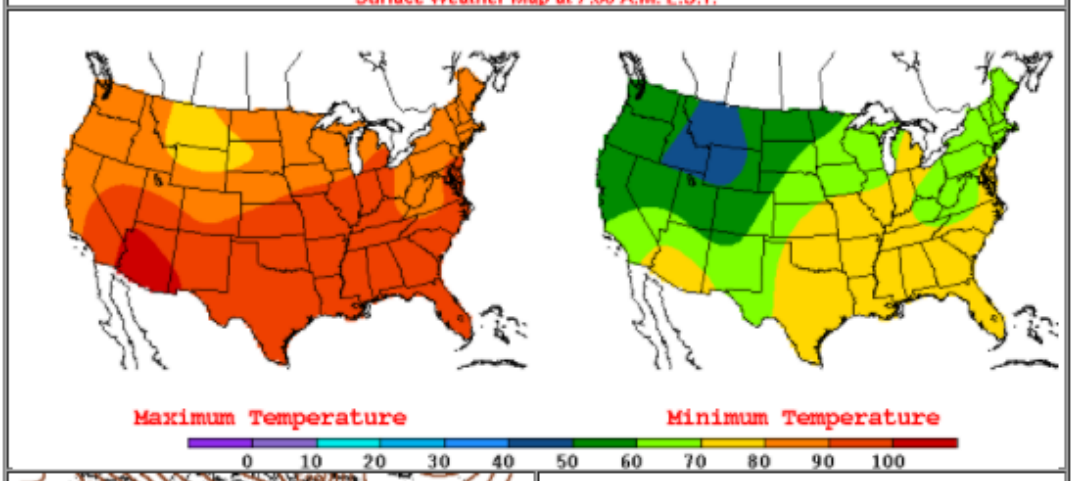


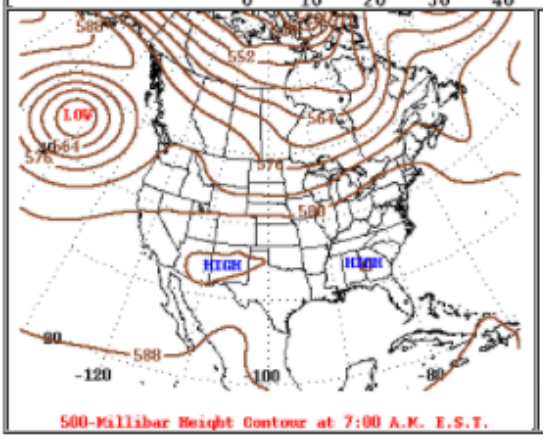


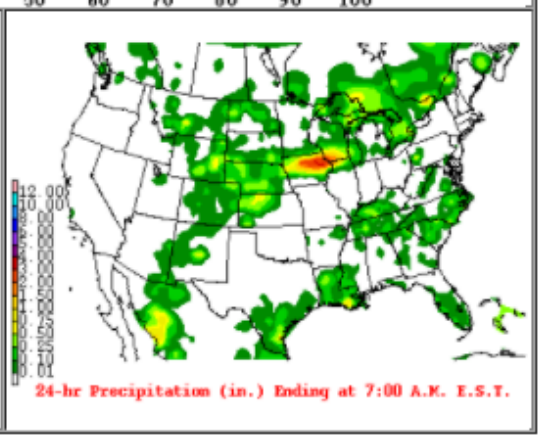


MONDAY AUGUST 6, 2018

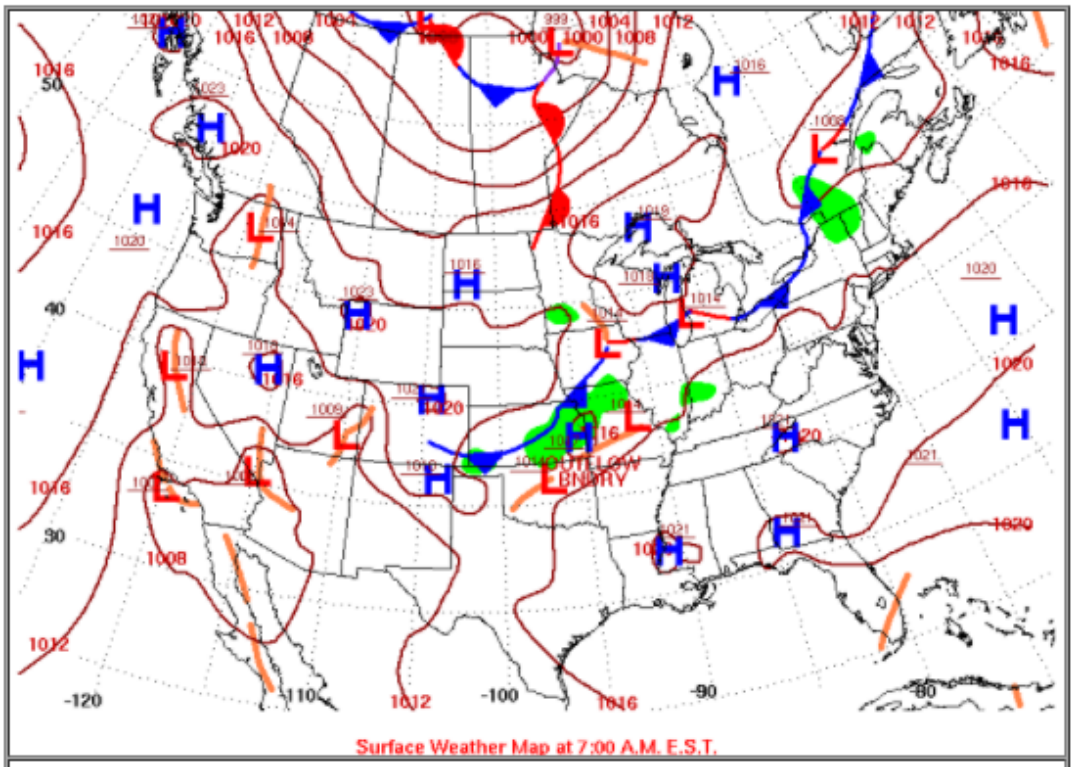


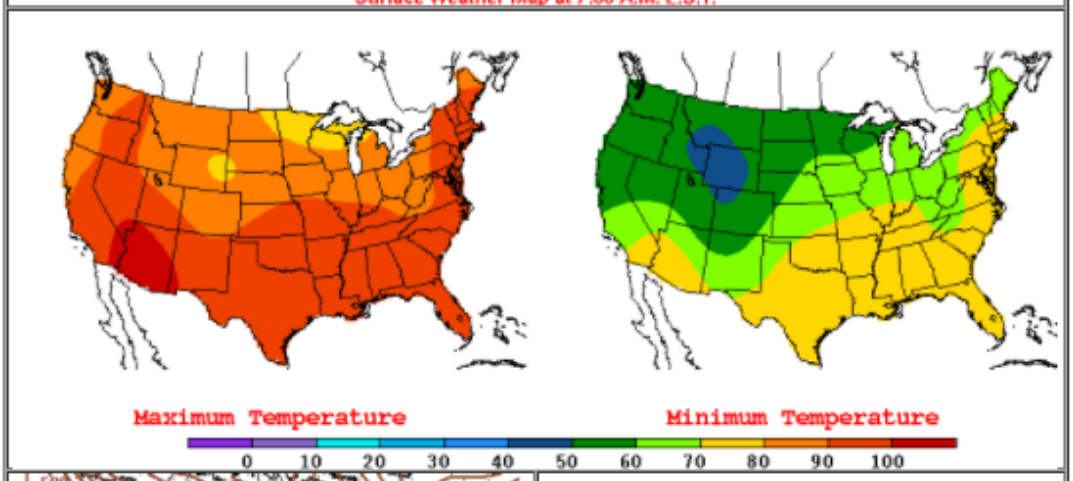


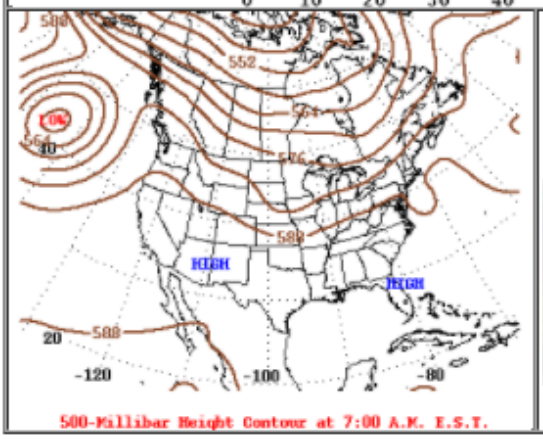


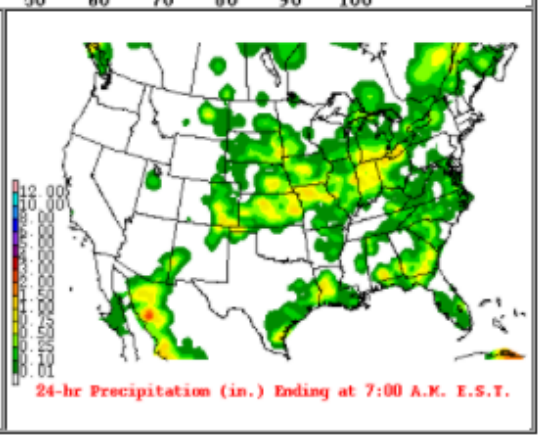


TUESDAY AUGUST 7, 2018

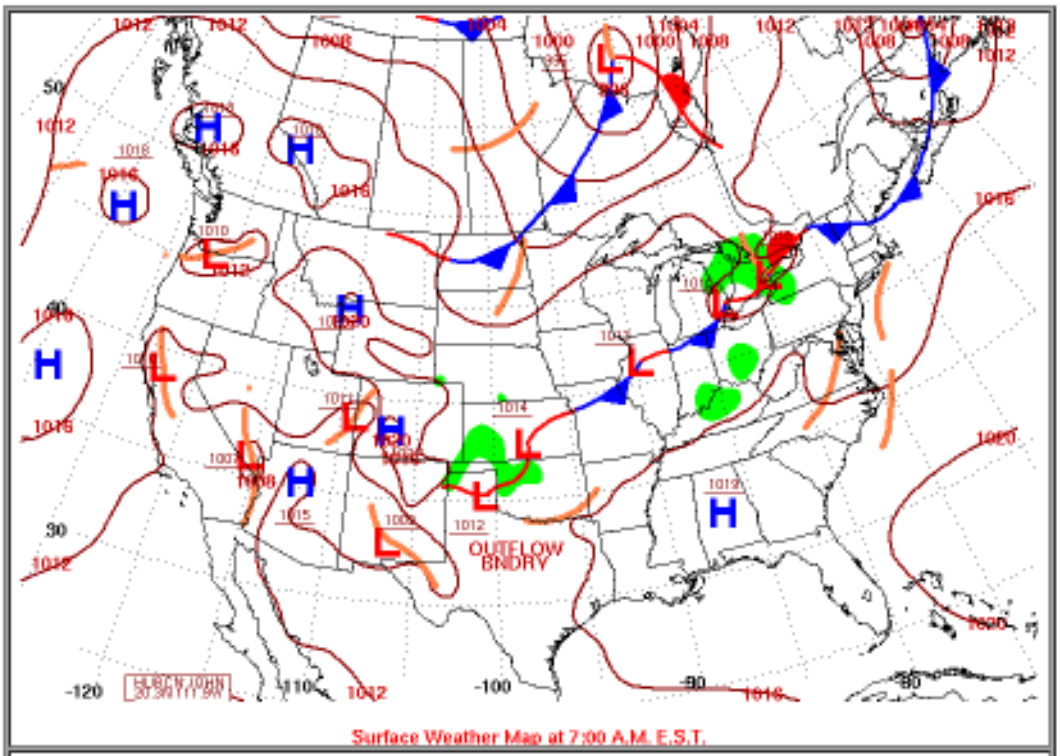




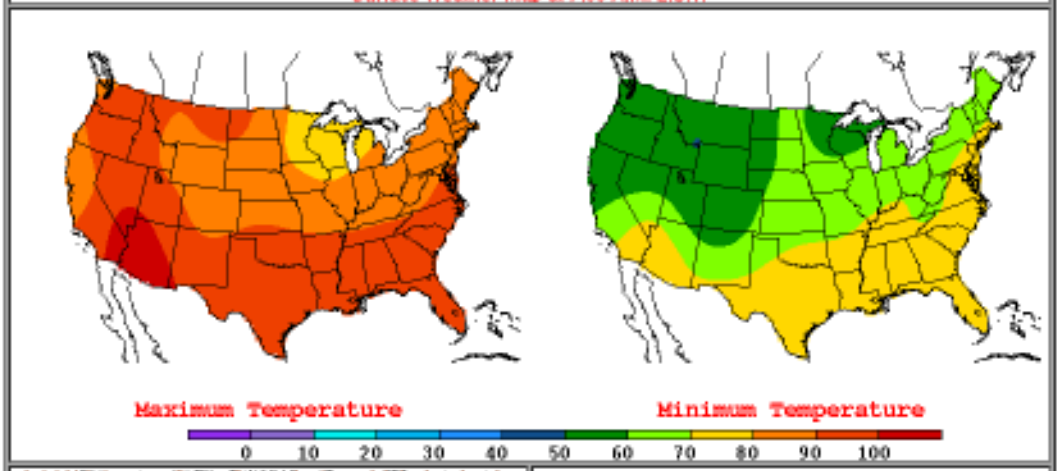


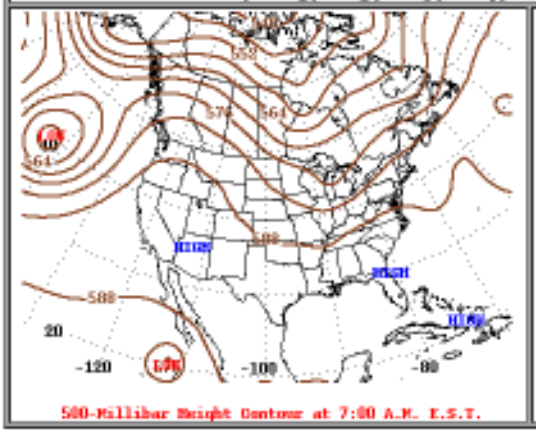


WEDNESDAY AUGUST 8, 2018

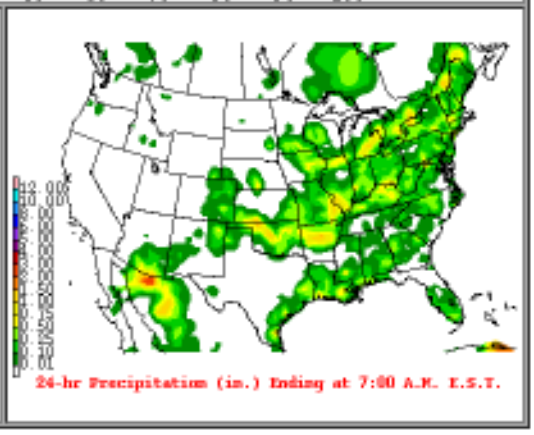


Surface Weather Map at 7:00 A.M. E.S.T.



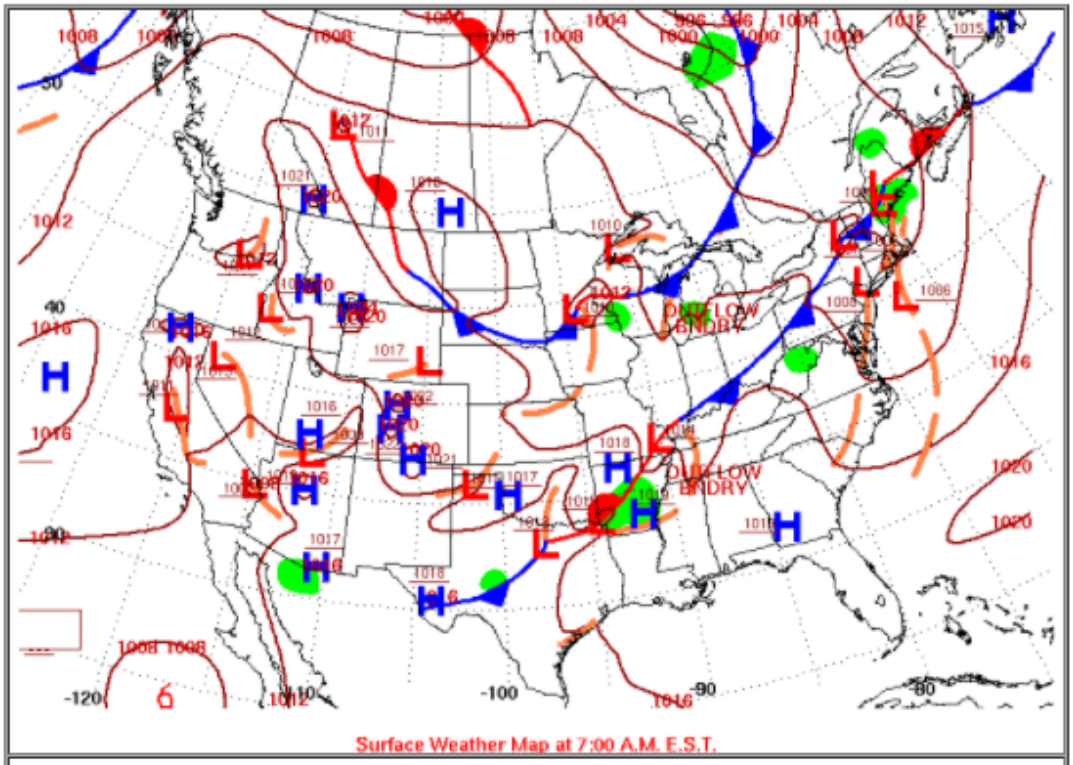


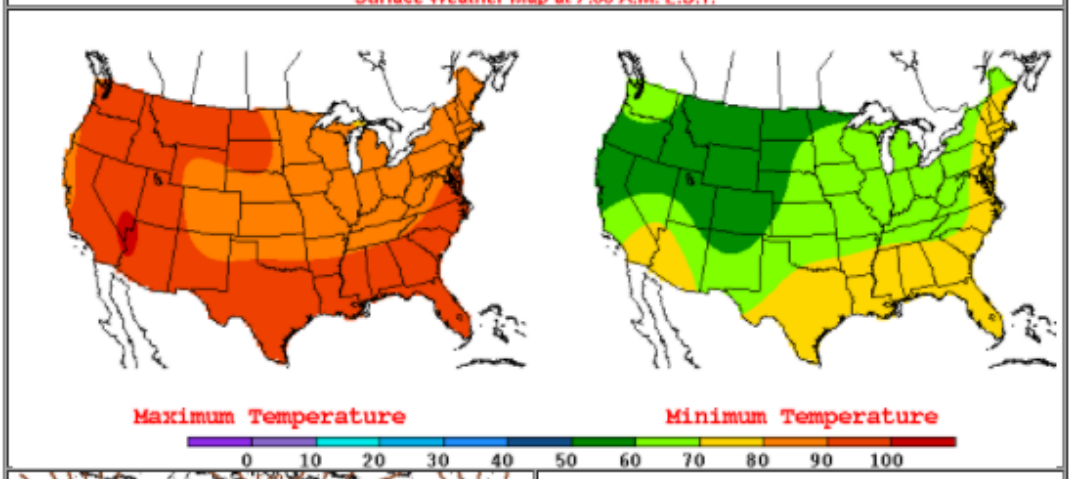
500-Millibar Height Contour at 7:00 A.M. E.S.T.

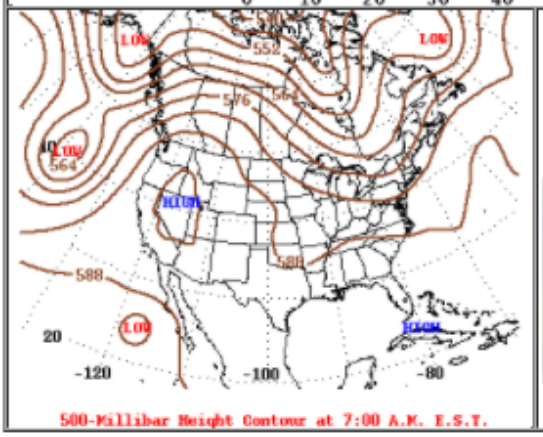


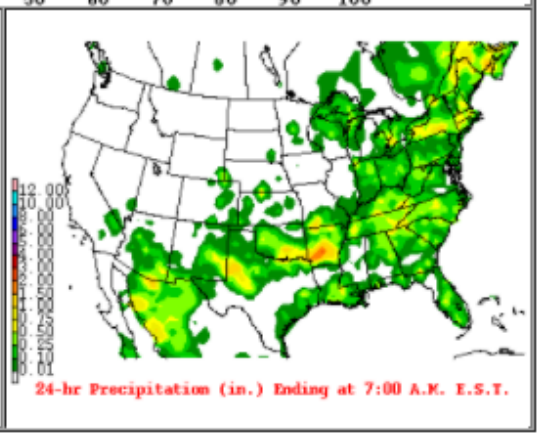
24-hr Precipitation (in.) Ending at 7:00 A.M. E.S.T.

THURSDAY AUGUST 9, 2018









B. NWS Area Forecast Discussions/Air Quality Alerts[52]

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687
AEUS76 KLOX 071510
AQALOX

Air Quality Alert
Relayed by National Weather Service Los Angeles/Oxnard CA
810 AM PDT Tue Aug 7 2018

CAZ037-051-082100-
San Luis Obispo County Interior Valleys-
San Luis Obispo County Mountains-
Including the cities of Paso Robles, Atascadero, and Black Mountain
810 AM PDT Tue Aug 7 2018

...AIR QUALITY ALERT DUE TO SMOKE IMPACTS FROM WILDFIRES IN EFFECT
UNTIL 2 PM PDT WEDNESDAY...

The San Luis Obispo County Air Pollution Control District has issued
an air quality alert due to smoke impacts in San Luis Obispo County.
Smoke from wildfires is mainly impacting the Eastern and Central
parts of San Luis Obispo County; however, smoke may be intermittently
present in the coastal areas as well.

Exposure to particle pollution can cause serious health problems,
aggravate lung disease, cause asthma attacks and acute bronchitis,
and increase risk of respiratory infections.

Residents are advised to use caution as conditions warrant. People
with heart or lung disease should follow their doctors advice for
dealing with episodes of blowing dust.

Additionally, older adults and children should avoid prolonged
exposure, strenuous activity or heavy exertion, as conditions
dictate.

For the latest air quality forecasts and information, visit the San
Luis Obispo County Air Pollution Control District website at
www.slocleanair.org. or call 805 781 5912

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[52] ISU, Iowa Environmental Mesonet, *NWS Text Products*, last accessed 7/29/21

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395
AEUS76 KLOX 081503
AQALOX

Air Quality Alert
Relayed by National Weather Service Los Angeles/Oxnard CA
803 AM PDT Wed Aug 8 2018

CAZ037-051-092100-
San Luis Obispo County Interior Valleys-
San Luis Obispo County Mountains-
Including the cities of Paso Robles, Atascadero, and Black Mountain
803 AM PDT Wed Aug 8 2018

...AIR QUALITY ALERT DUE TO SMOKE IMPACTS FROM WILDFIRES IN EFFECT
UNTIL 2 PM PDT THURSDAY...

The San Luis Obispo County Air Pollution Control District has issued
an air quality alert due to smoke impacts in San Luis Obispo County.
Smoke from wildfires is mainly impacting the Eastern and Central
parts of San Luis Obispo County; however smoke may be intermittently
present in the coastal areas, as well.

Exposure to particle pollution can cause serious health problems...
aggravate lung disease...cause asthma attacks and acute bronchitis...
and increase risk of respiratory infections.

Residents are advised to use caution as conditions warrant. People
with heart or lung disease should follow their doctor's advice for
dealing with episodes of blowing dust.

Additionally...older adults and children should avoid prolonged
exposure...strenuous activity or heavy exertion...as conditions
dictate.

For the latest air quality forecasts and information...visit the San
Luis Obispo County Air Pollution Control District website at
www.slocleanair.org or call 805 781 5912.

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681
AEUS76 KLOX 091746
AQALOX

Air Quality Alert
Relayed by National Weather Service LOS ANGELES - Oxnard CA
1046 AM PDT Thu Aug 9 2018

CAZ037-051-102100-
San Luis Obispo County Interior Valleys-
San Luis Obispo County Mountains-
Including the cities of Paso Robles, Atascadero, and Black Mountain
1046 AM PDT Thu Aug 9 2018

...AIR QUALITY ALERT DUE TO SMOKE IMPACTS FROM WILDFIRES IN EFFECT UNTIL 2 PM PDT FRIDAY...

The San Luis Obispo County Air Pollution Control District has issued an air quality alert due to smoke impacts in San Luis Obispo County. Smoke from wildfires is mainly impacting the Eastern and Central parts of San Luis Obispo County; however smoke may be intermittently present in the coastal areas, as well.

Exposure to particle pollution can cause serious health problems... aggravate lung disease...cause asthma attacks and acute bronchitis... and increase risk of respiratory infections.

Residents are advised to use caution as conditions warrant. People with heart or lung disease should follow their doctor's advice for dealing with episodes of blowing dust.

Additionally...older adults and children should avoid prolonged exposure...strenuous activity or heavy exertion...as conditions dictate.

For the latest air quality forecasts and information...visit the San Luis Obispo County Air Pollution Control District website at www.slocleanair.org or call 805 781 5912.

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15

IV. Transport

A. HYSPLIT Forward Trajectory[53]

The forward dispersion tool of the HYSPLIT model was used to indicate how emissions from the wildfires were transported toward the monitor. The estimated time of arrival from the fire was used to indicate contributing wildfires to the concentrations at the monitor. The HYSPLIT dispersion model was run from each major fire starting 36 hours prior to maximum ozone concentration at the Red Hills site for each date. These dispersion model runs provide for insight into a hypothetical plume of smoke spreading from each fire and the approximate number of hours to reach an area. This provides for a generalized understanding of smoke transport from a fire across a region, connecting a wildfire with smoke in satellite imagery, and finding potential correlations at a site through analysis of plume coverage timing and backwards trajectories when they overlap.

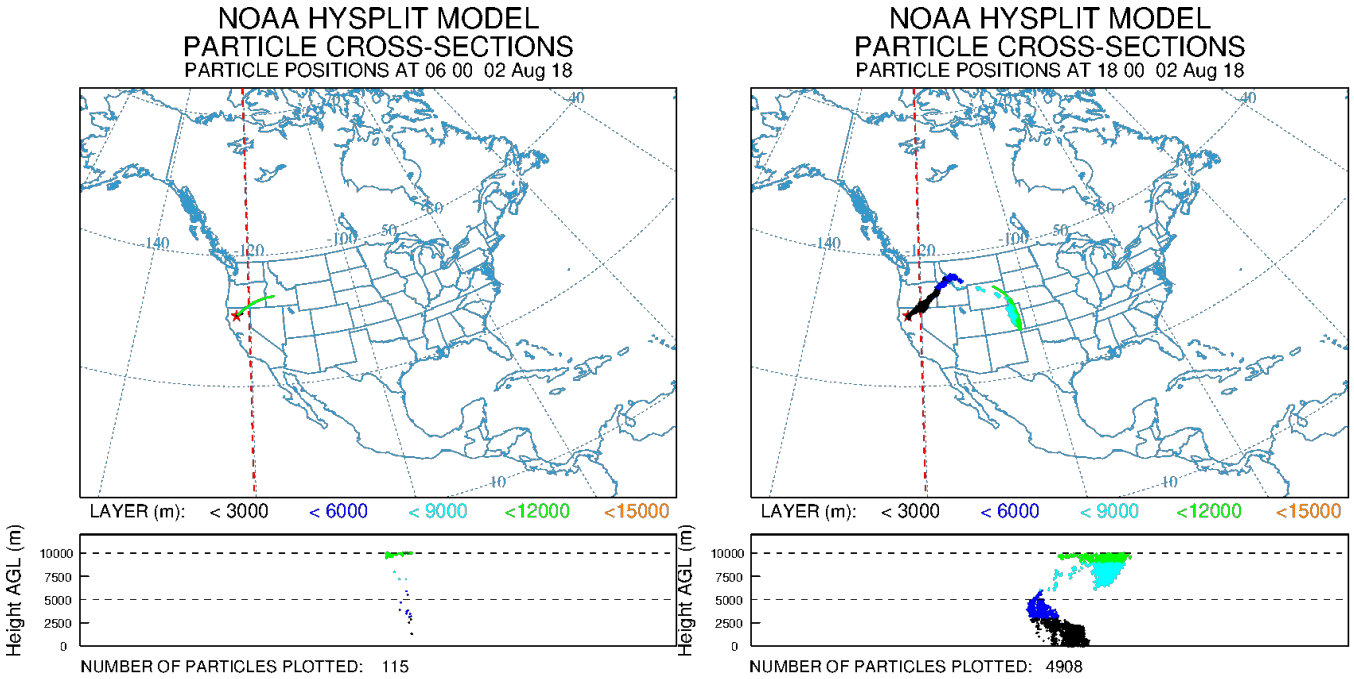
NOAA HYSPLIT Model (Gaseous Particles) indicates potential particle emissions from each fire. Model times are in UTC (adjust -8 hours for Pacific Standard Time. Red dashed vertical line is a South-North cross section at the longitude of Red Hills monitoring site (120.23135W).

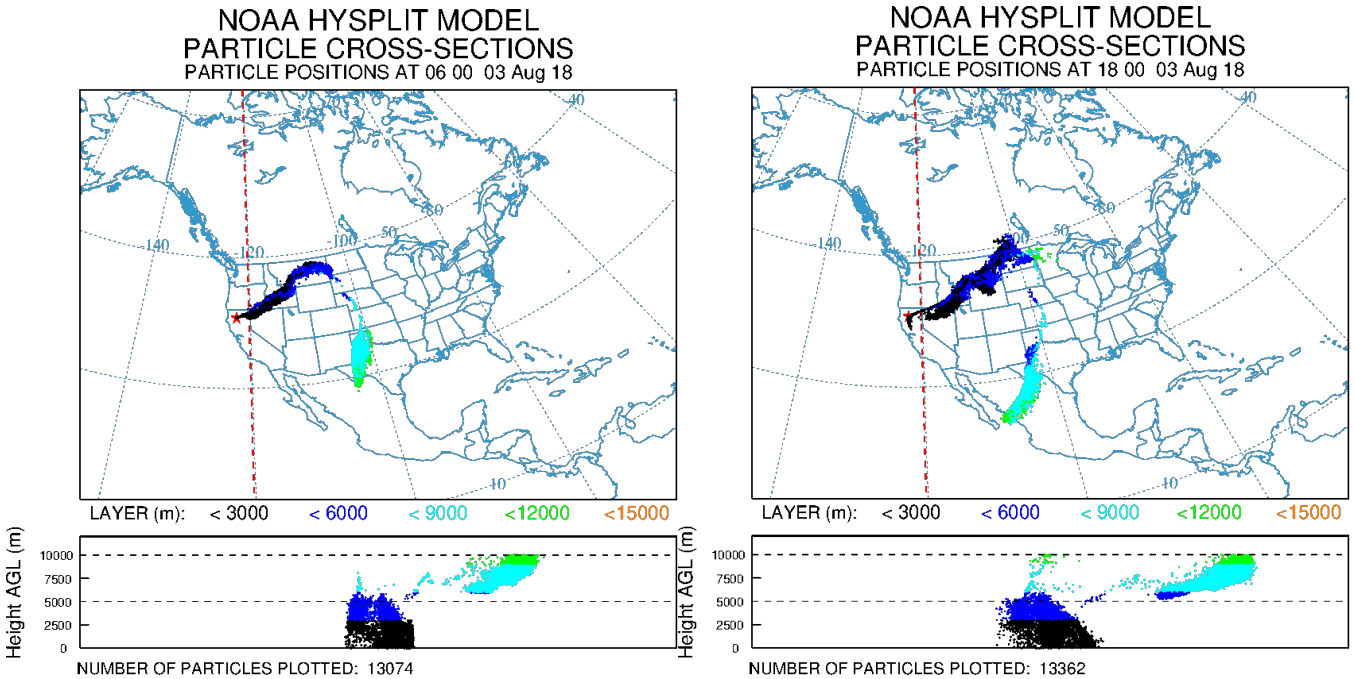
1. Carr Fire

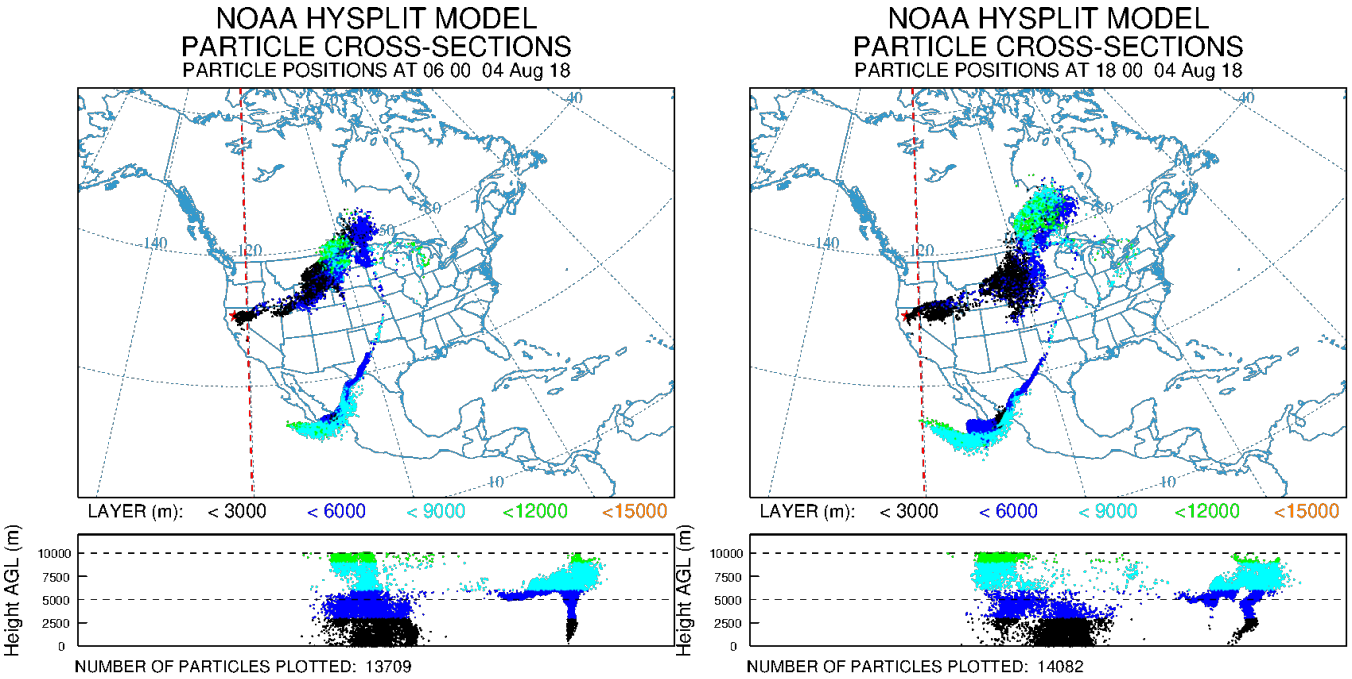
NOAA HYSPLIT Model (Gaseous Particles) with releases starting 02/0000 UTC. Model results below shown at 12 hour intervals starting August 2, 2018 06UTC.

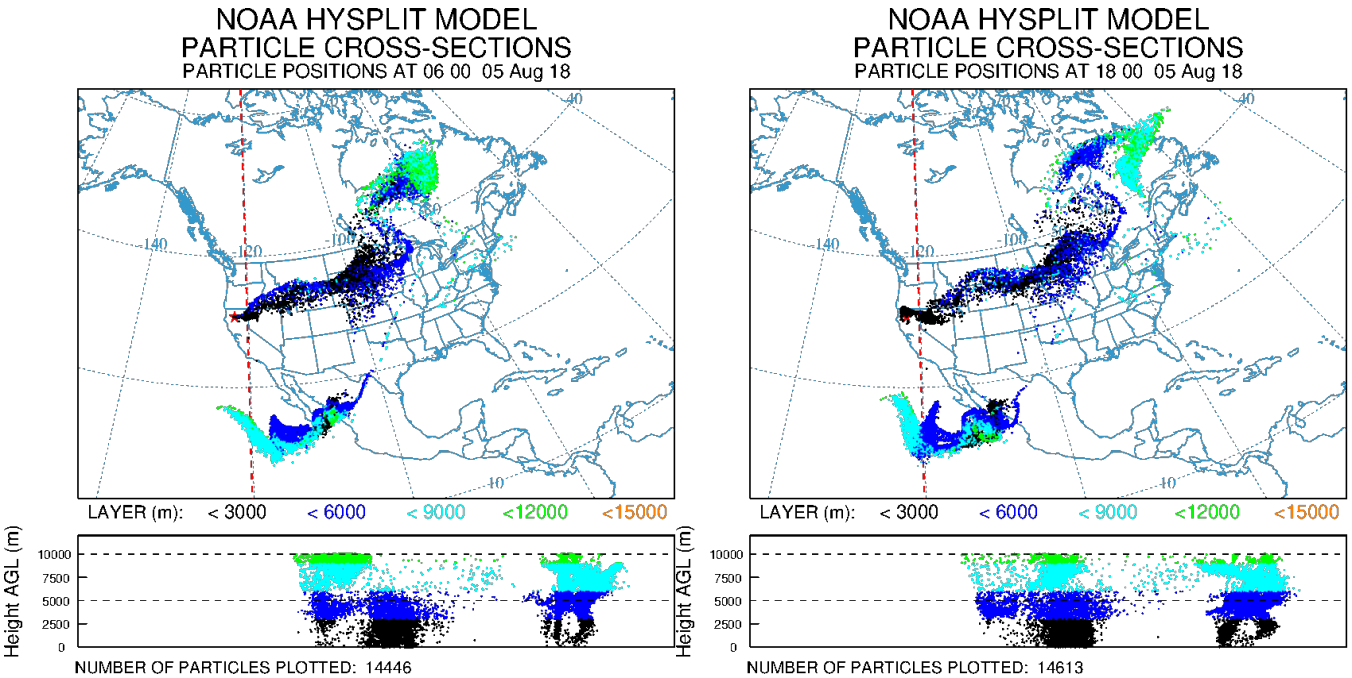
Conditions allowed for wildfire smoke from the Carr Fire (40.654N, 122.624W) to pool in the Sacramento Valley during the evening of August 5 into August 6. Low level winds shifted northerly and blew smoke southward along the eastern side of the Coastal Range during August 7 and reached the Red Hills area around midday. The Carr Fire contributed to near-surface smoke in the southern San Joaquin Valley region into August 9.

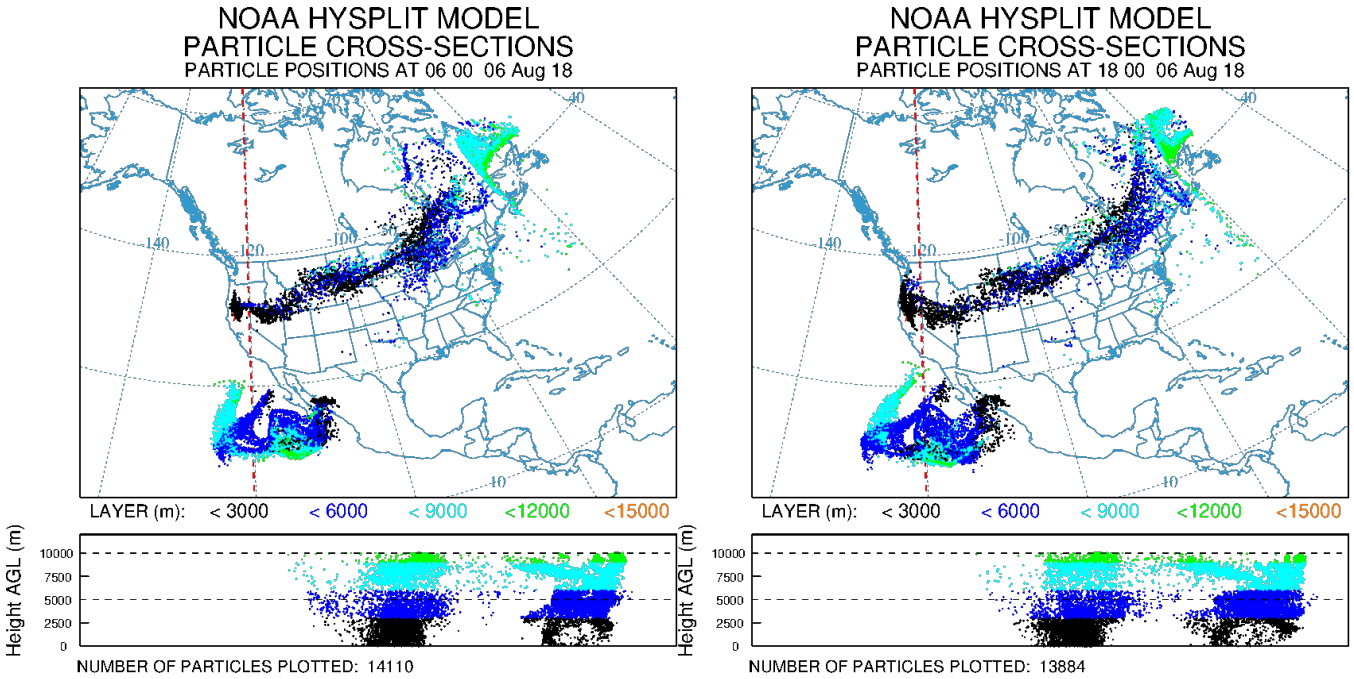
[53] CARB acknowledges the NOAA Air Resources Laboratory, Real-time Environmental Applications and Display System (READY), for the provision of the *HYSPLIT-WEB transport and dispersion model* used in this document.

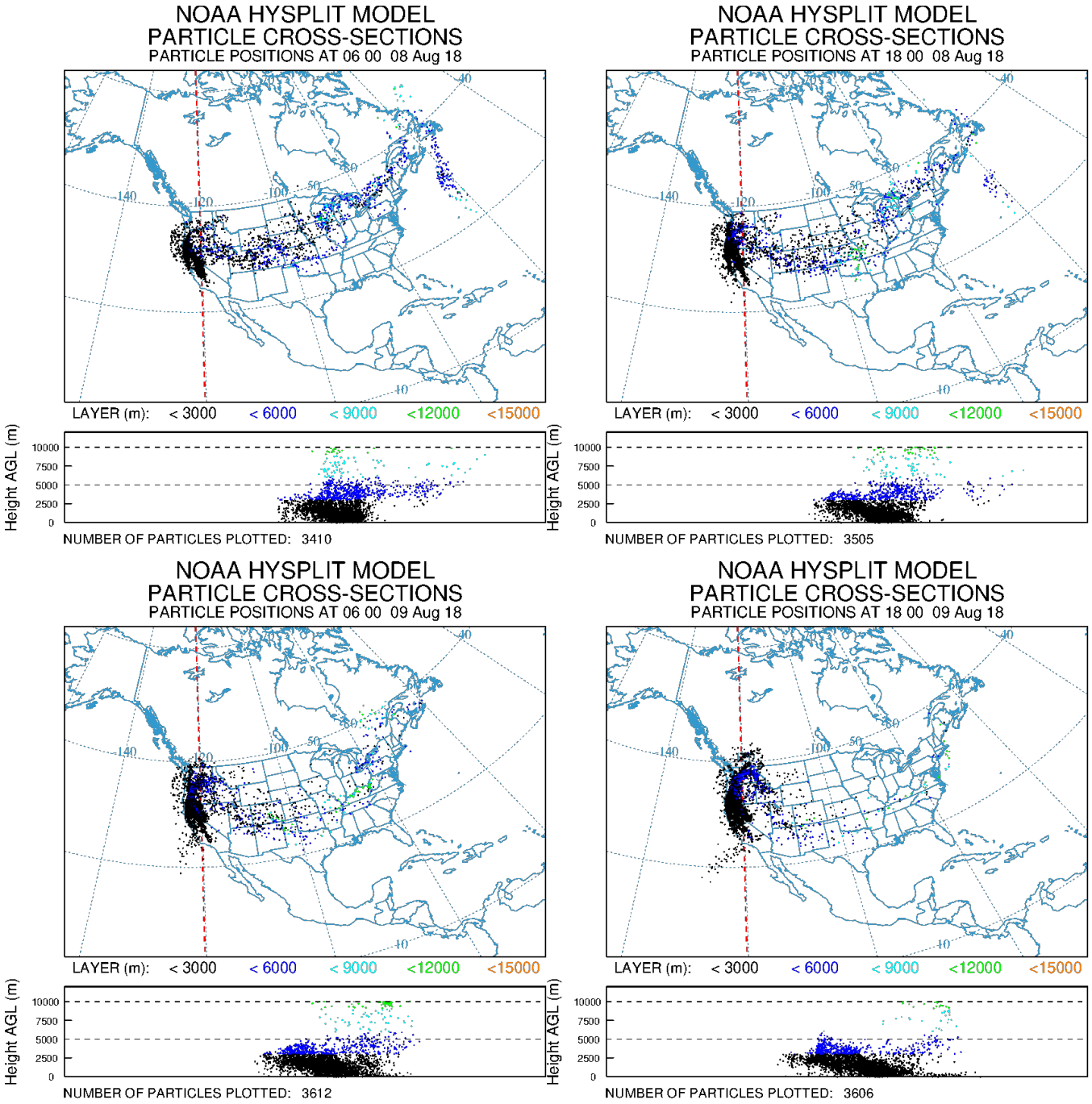

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 02 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 115
NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 02 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
NUMBER OF PARTICLES PLOTTED: 4908


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 03 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 13074
NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 03 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
NUMBER OF PARTICLES PLOTTED: 13362


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 04 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 13709
NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 04 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 14082


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 05 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 14446
NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 05 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 14613

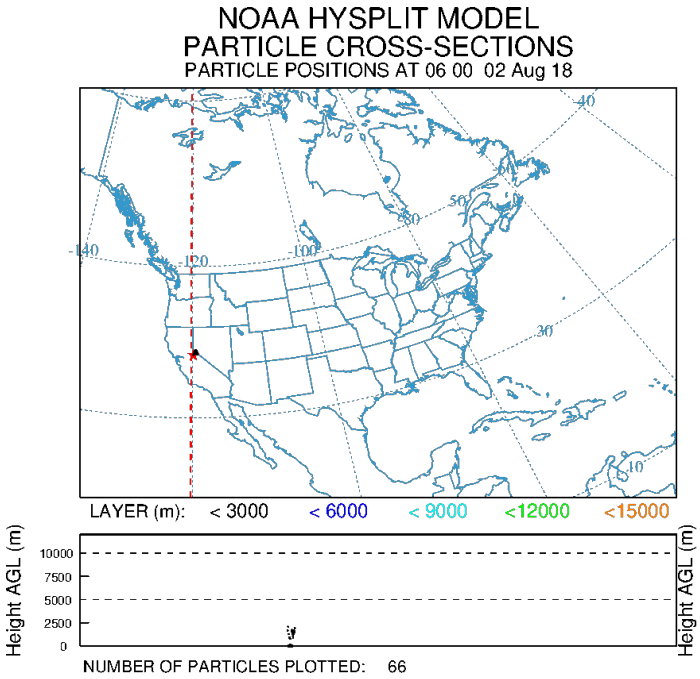

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 06 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 14110
NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 06 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
NUMBER OF PARTICLES PLOTTED: 13884
NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 07 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
NUMBER OF PARTICLES PLOTTED: 4985
NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 07 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
NUMBER OF PARTICLES PLOTTED: 3301

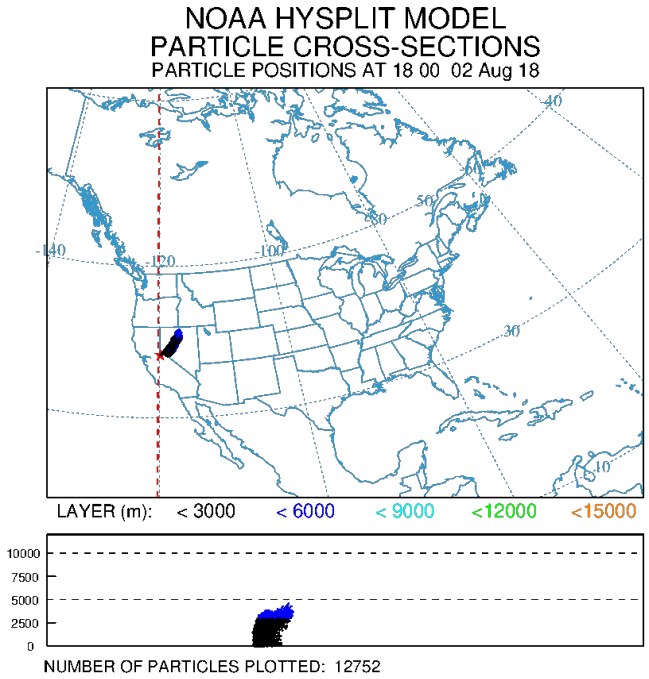


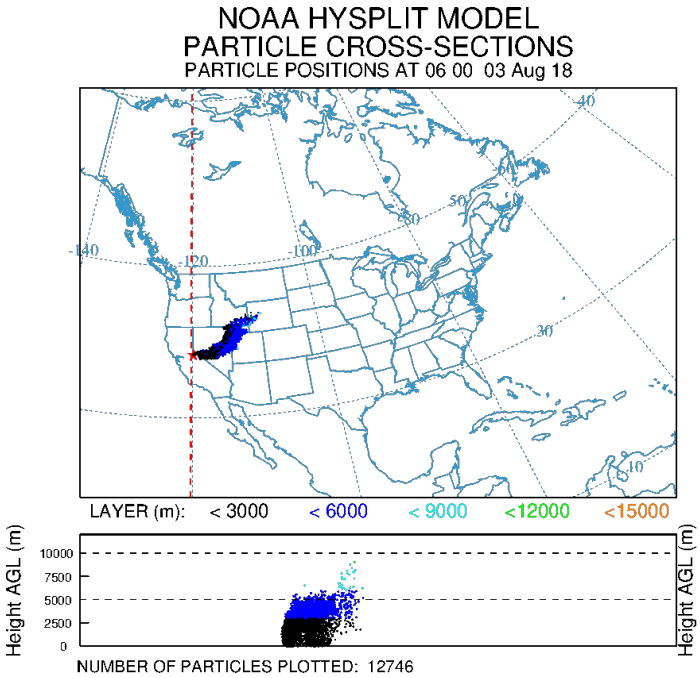
2. Donnell Fire

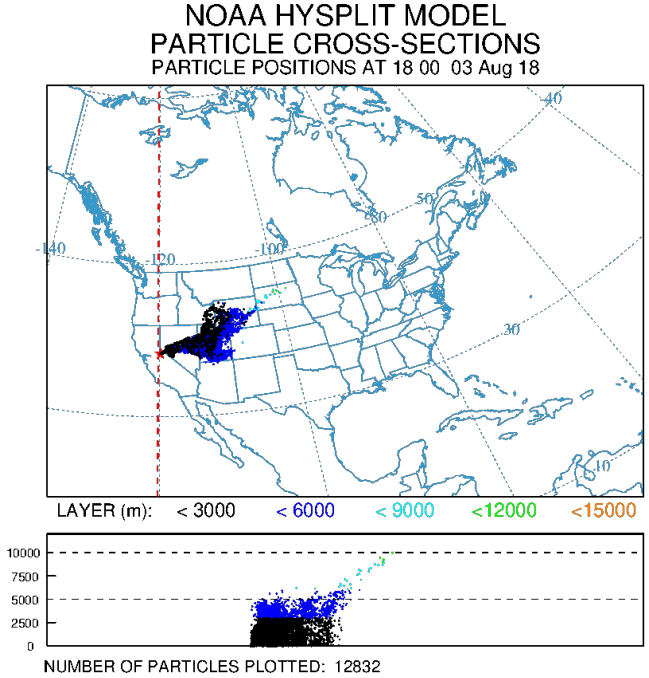
NOAA HYSPLIT Model (Gaseous Particles) with releases starting 02/0000 UTC. Model results below shown at 12 hour intervals starting August 2, 2018 06UTC.

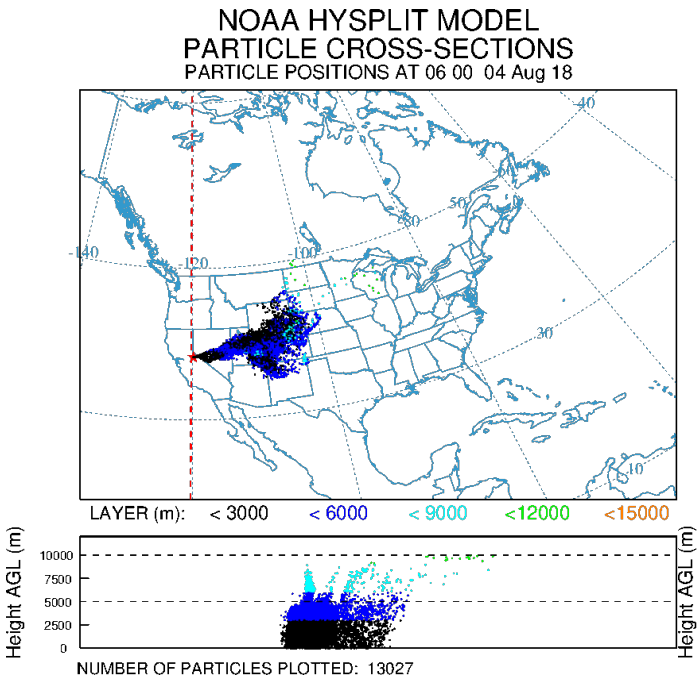
Near-surface smoke from the Donnell Fire (38.349N, 119.92W) built up along the central and northern Sierra Mountains during the morning of August 6. Weather shifted, blowing low-level smoke southward into the southern San Joaquin Valley and Red Hills area during the evening of August 7 through August 9.

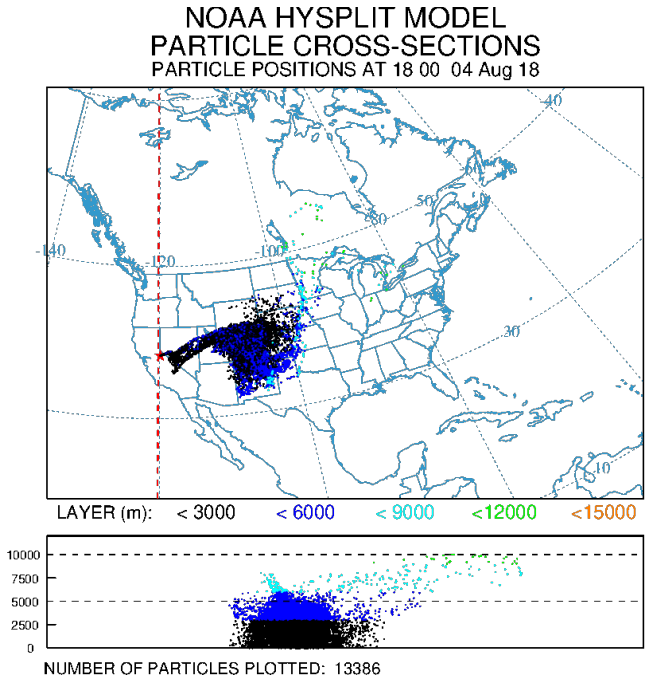

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 02 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 66

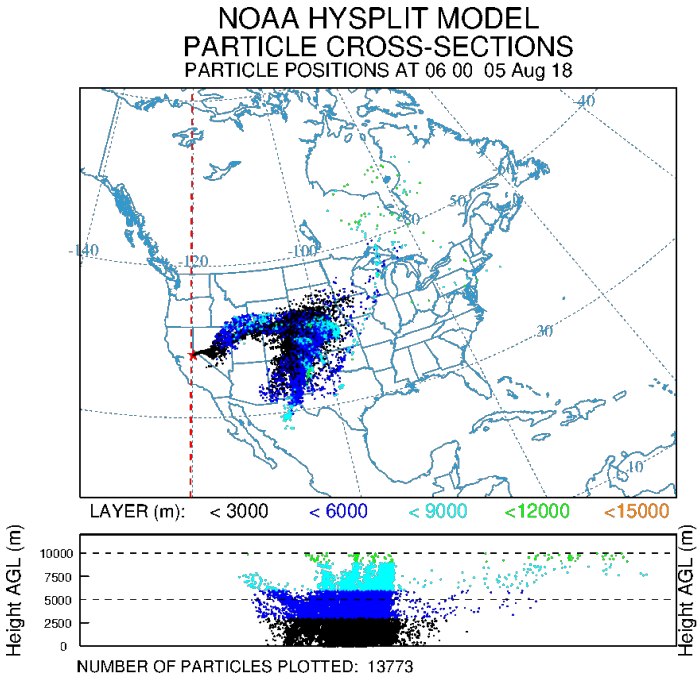

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 02 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 12752

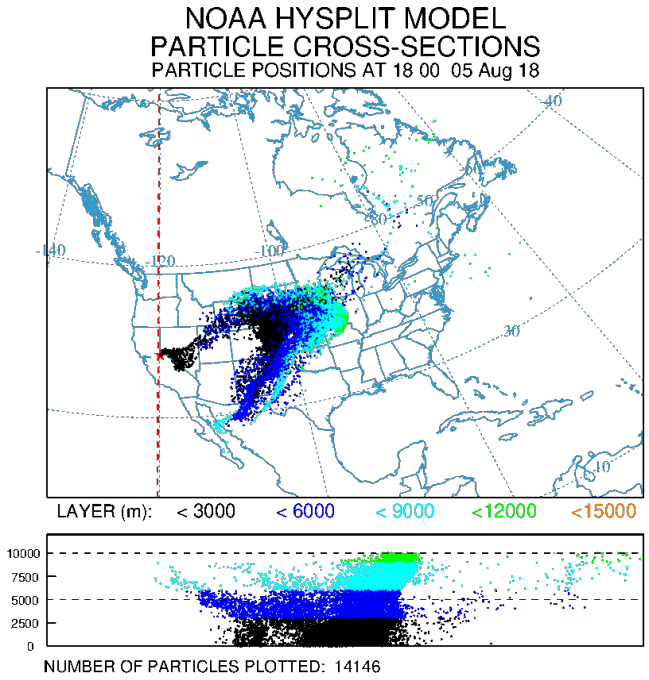

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 03 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 12746

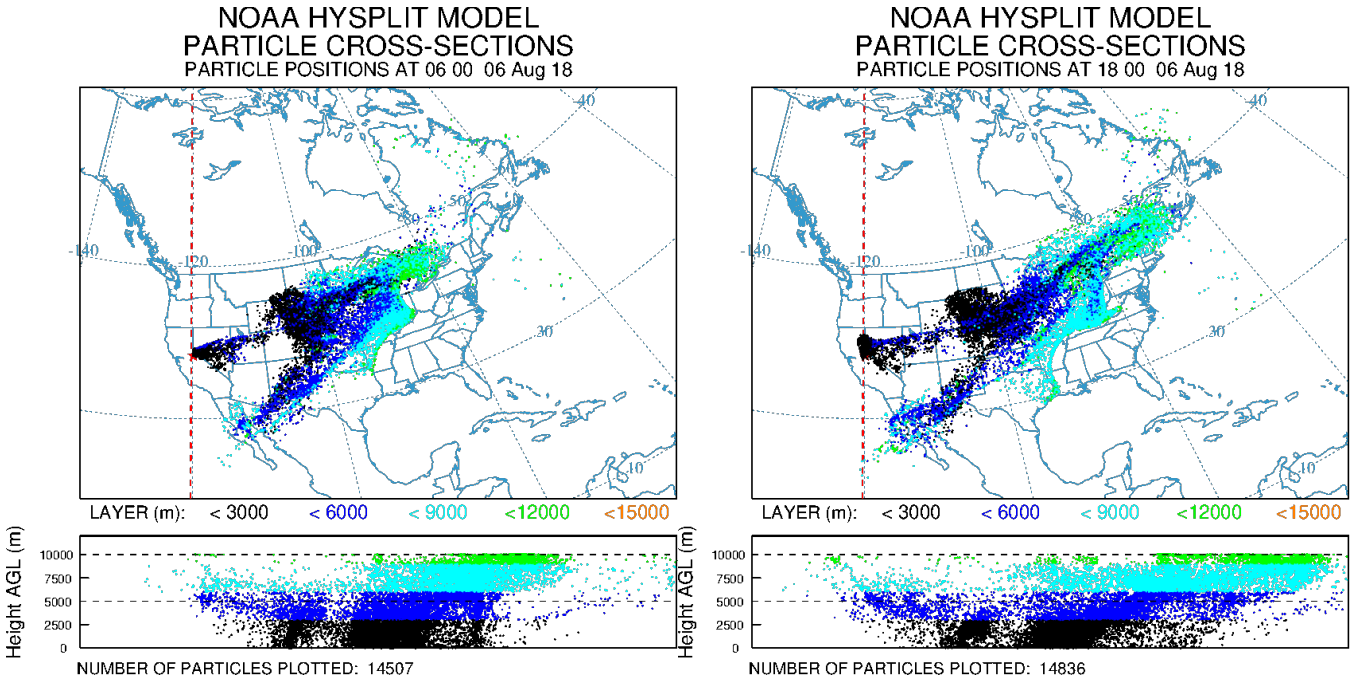

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 03 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 12832


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 04 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 13027

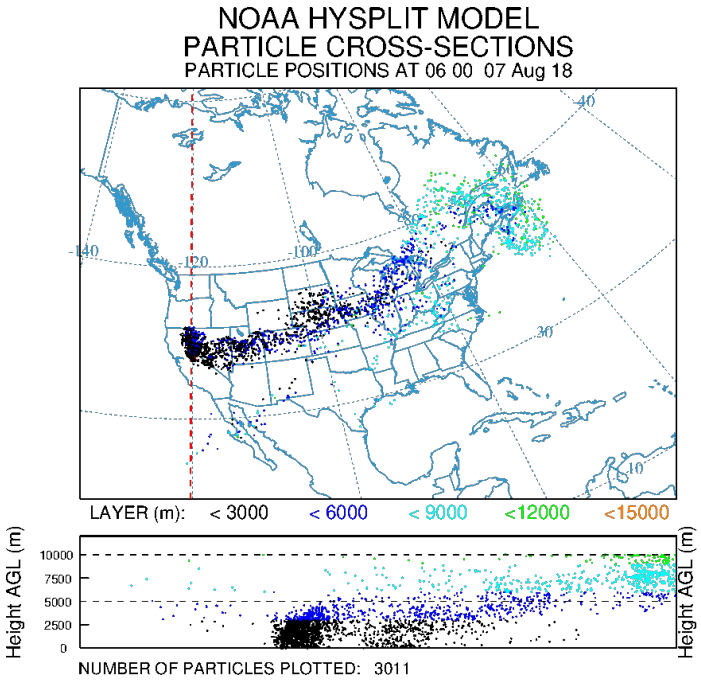

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 04 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 13386

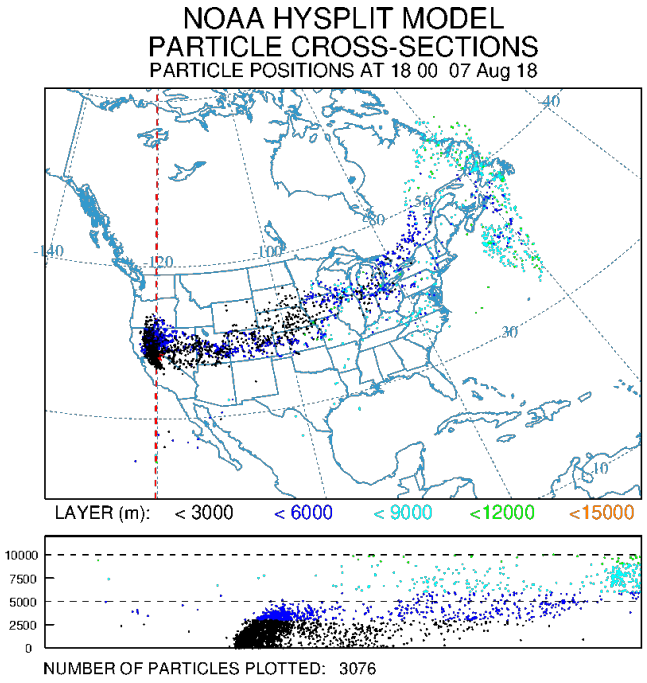

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 05 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 13773

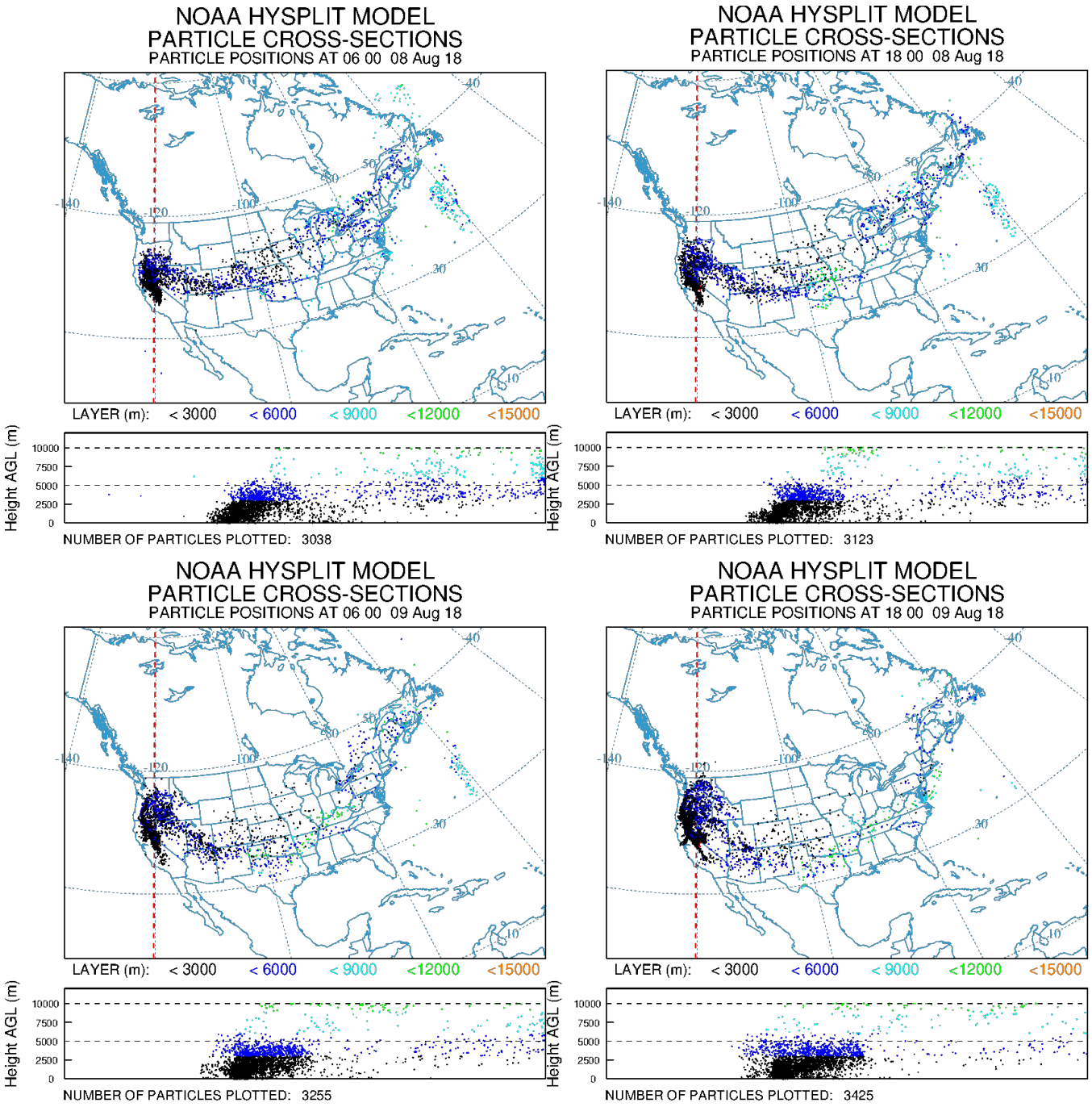

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 05 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 14146


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 06 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 14507

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 06 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 14836


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 07 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 3011


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 07 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 3076

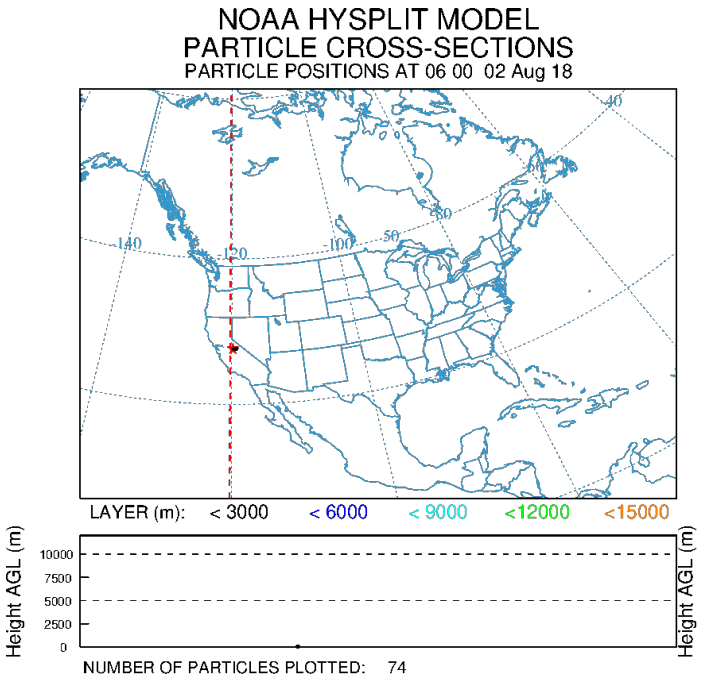


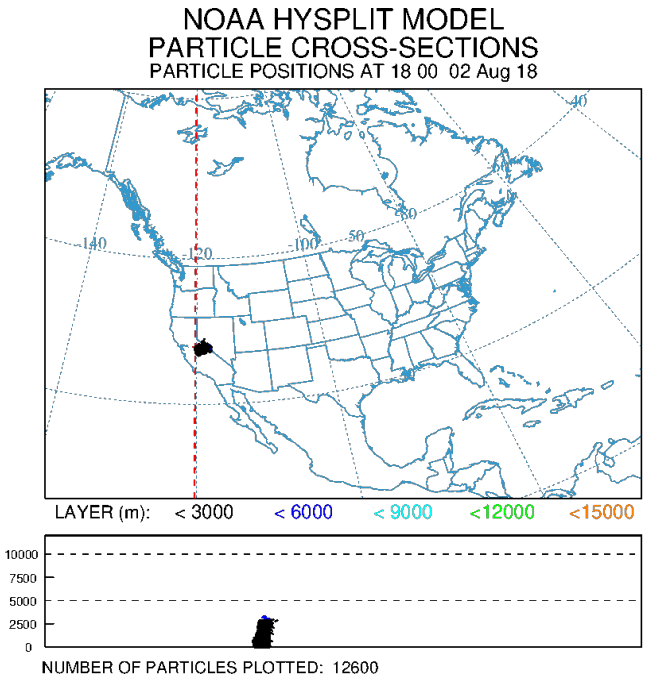
3. Ferguson Fire

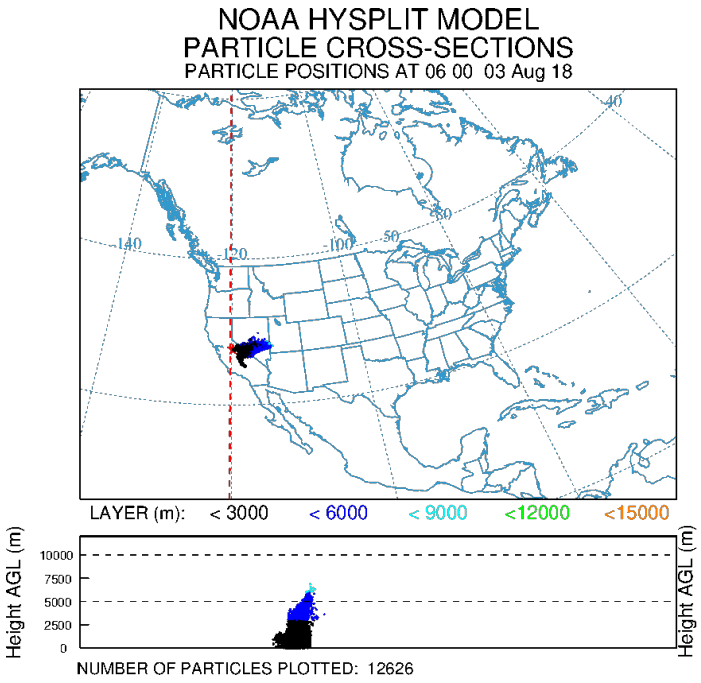
NOAA HYSPLIT Model (Gaseous Particles) with releases starting 02/0000 UTC. Model results below shown at 12 hour intervals starting August 2, 2018 06UTC.

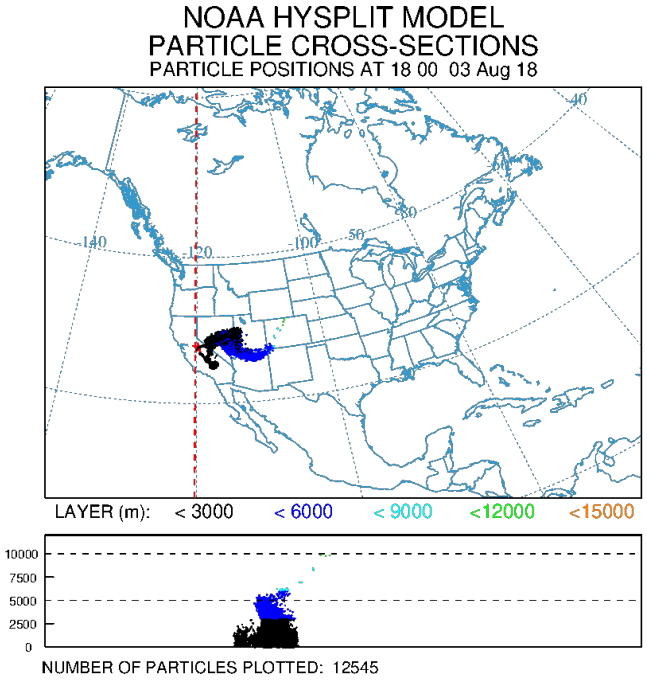
Near-surface smoke was transported from the Ferguson Fire (37.655N, 119.886W) along the southern Sierra Mountains, impacting much of the San Joaquin Valley on August 3 and 4, but likely remained north and east of the Red Hills monitoring site. During late on August 4 through August 5, most smoke in the San Joaquin Valley was blown east and northeastward over the Sierra Mountains allowing for the San Joaquin Valley to clear of smoke. On August

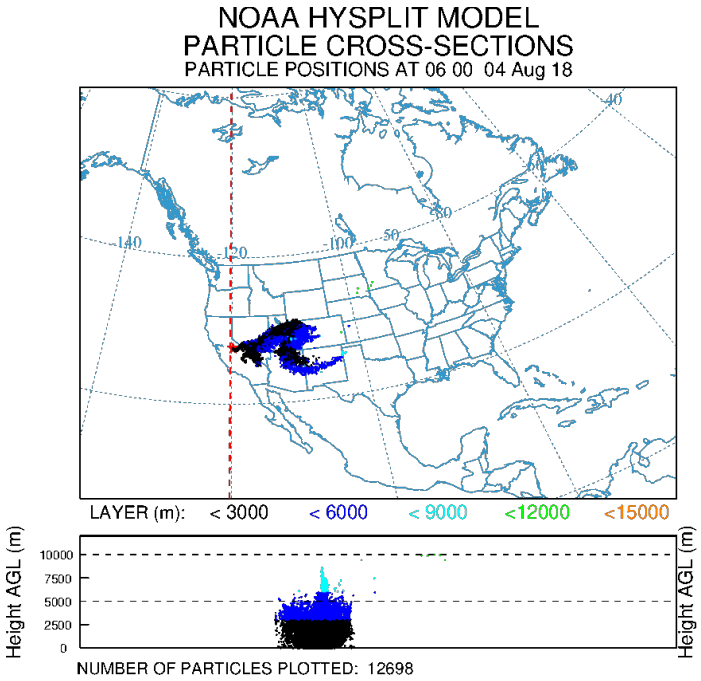
6, low level smoke builds along the Sierra Range, then filled across the Sacramento and San Joaquin Valleys on August 7. By midday, smoke appears to impact the Red Hills area, persisting through August 8, then thins on August 9.

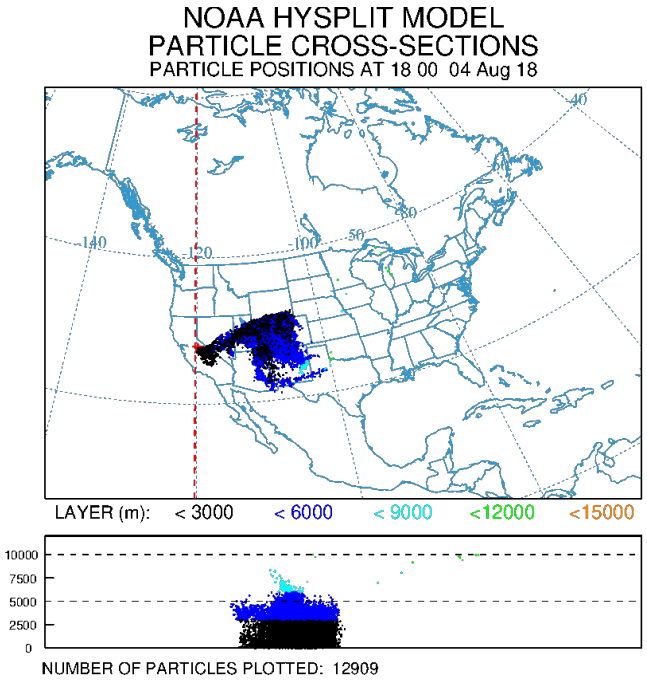


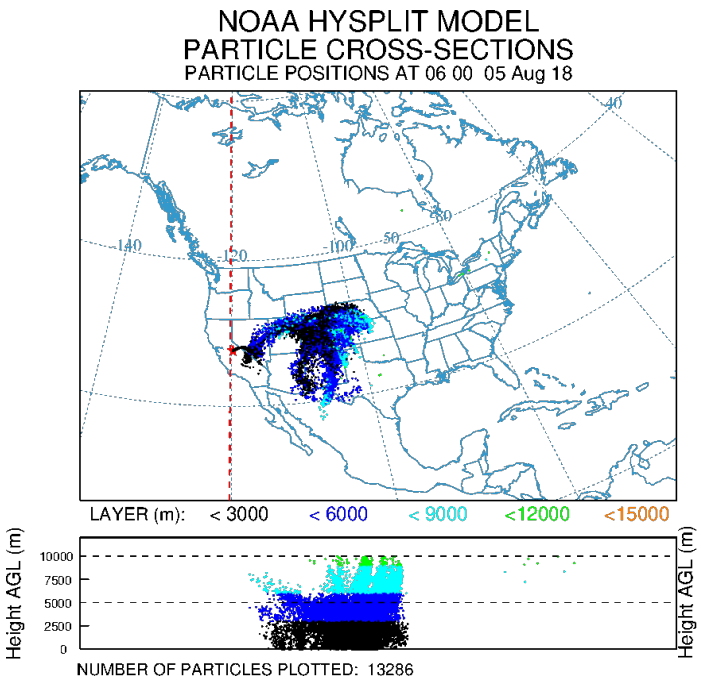


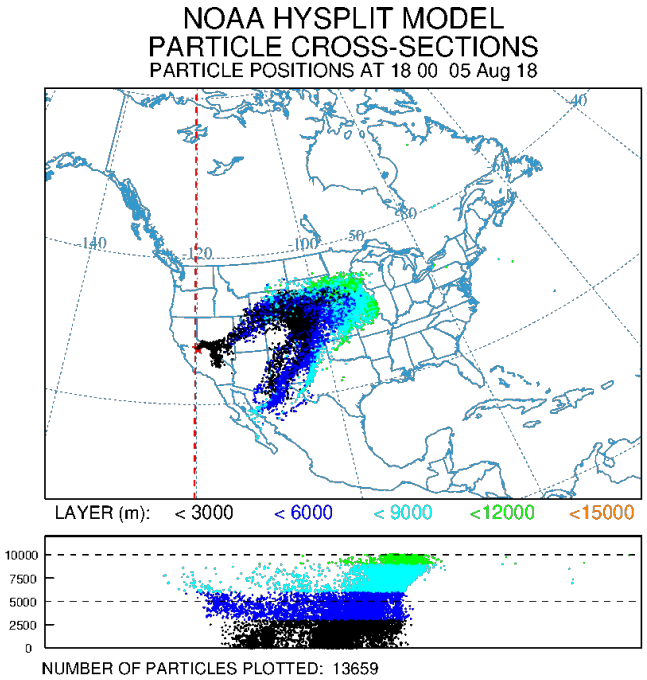


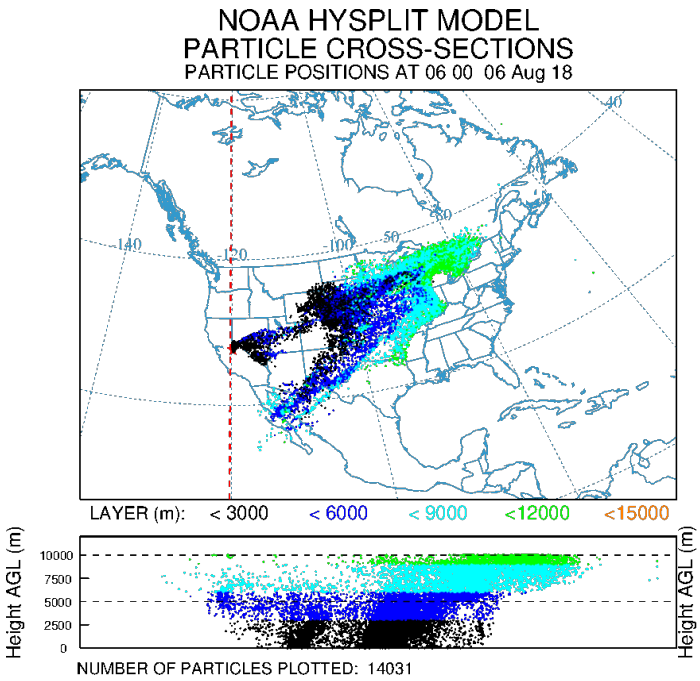


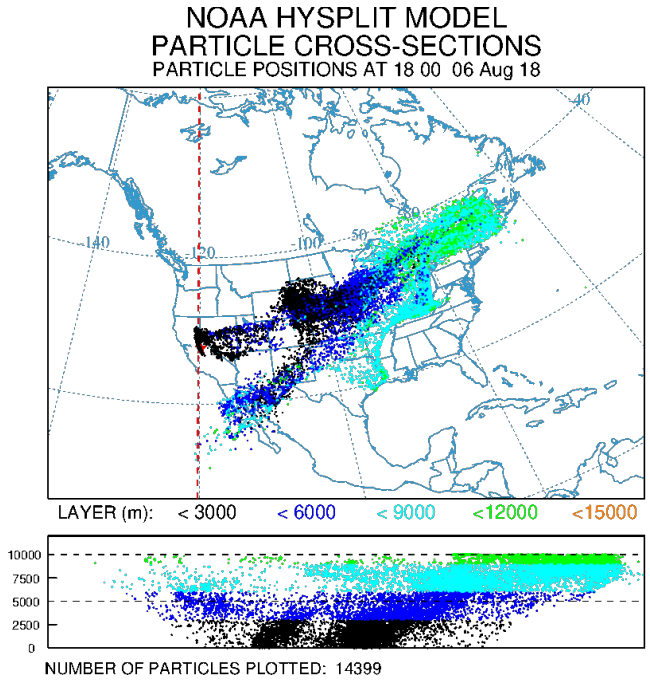

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 04 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 12698

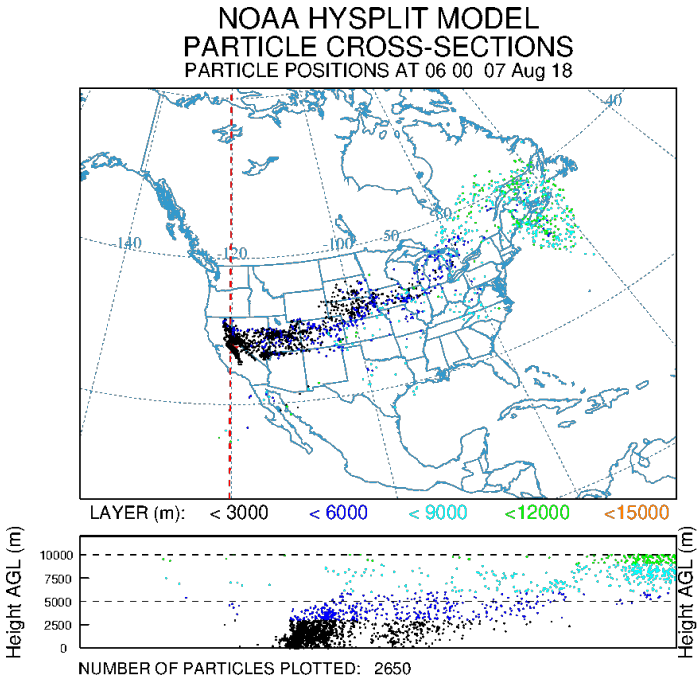

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 04 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 12909

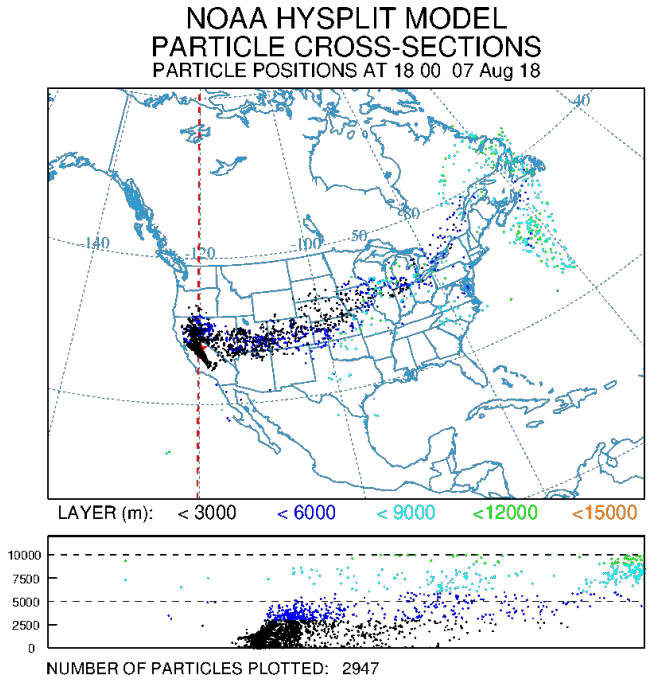

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 05 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 13286

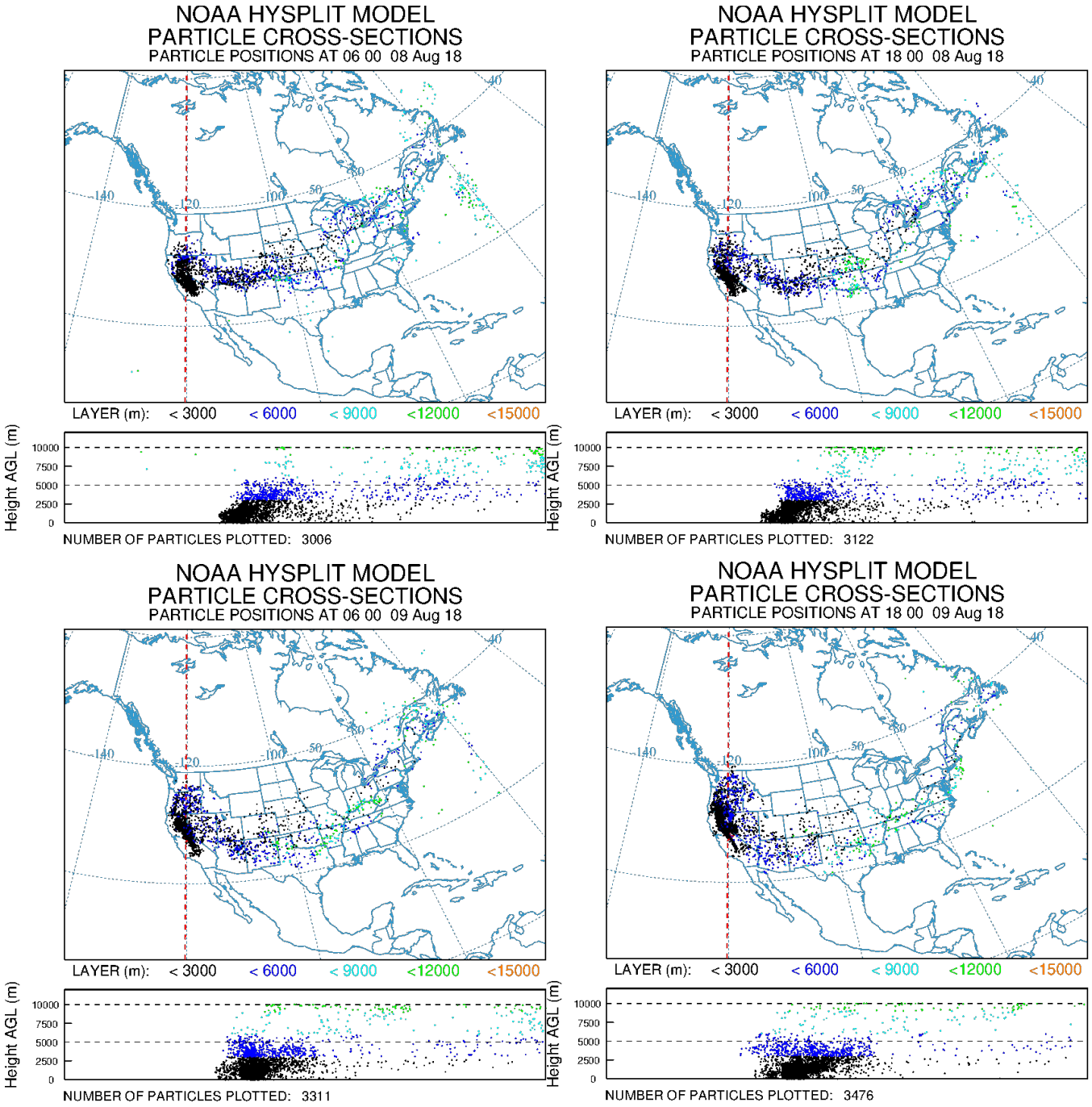

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 05 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 13659


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 06 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 14031


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 06 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 14399


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 07 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 2650

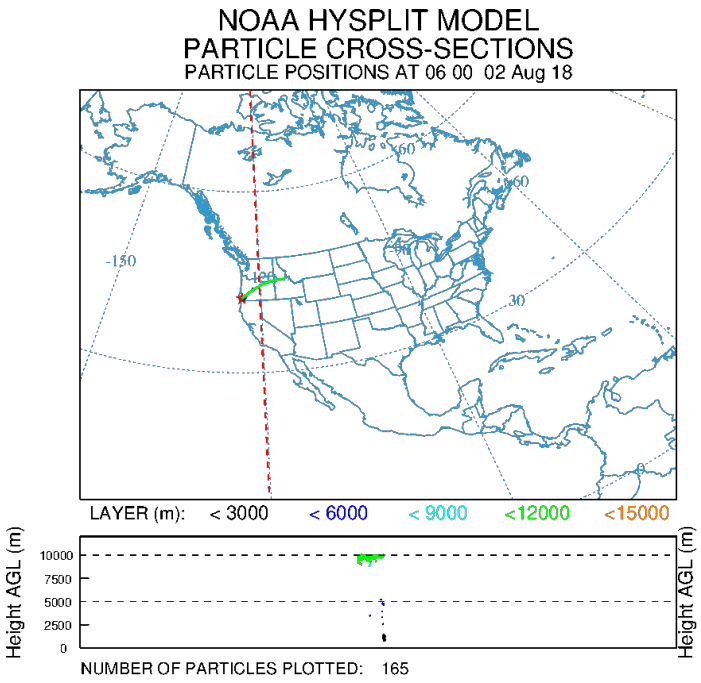

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 07 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 2947

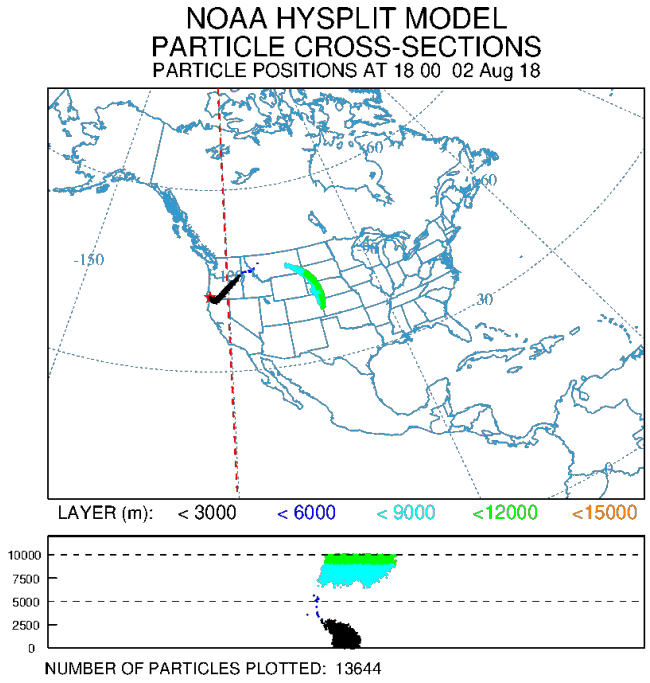


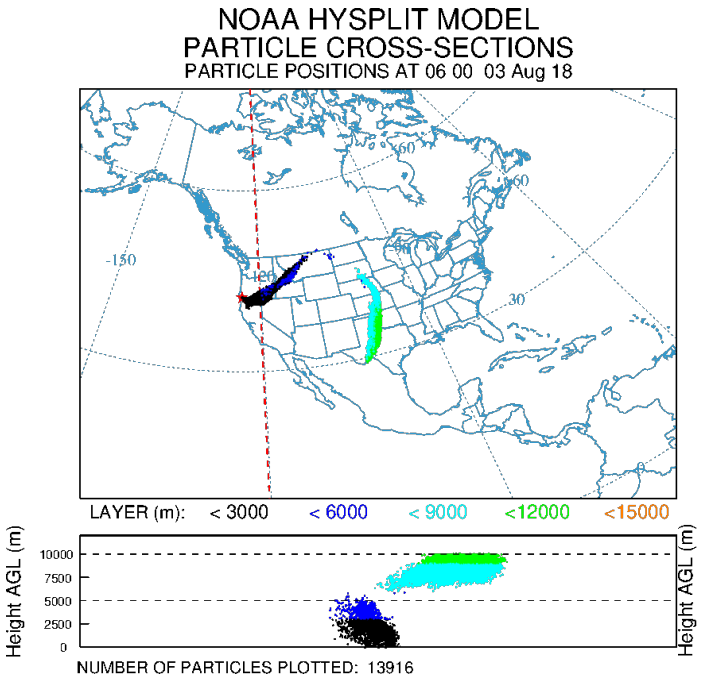
4. Klondike Fire

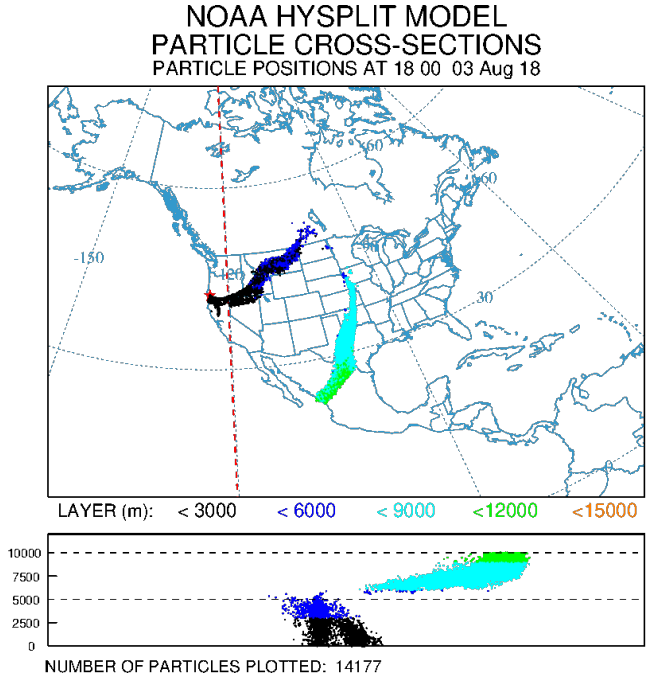
NOAA HYSPLIT Model (Gaseous Particles) with releases starting 02/0000 UTC. Model results below shown at 12 hour intervals starting August 2, 2018 06UTC.

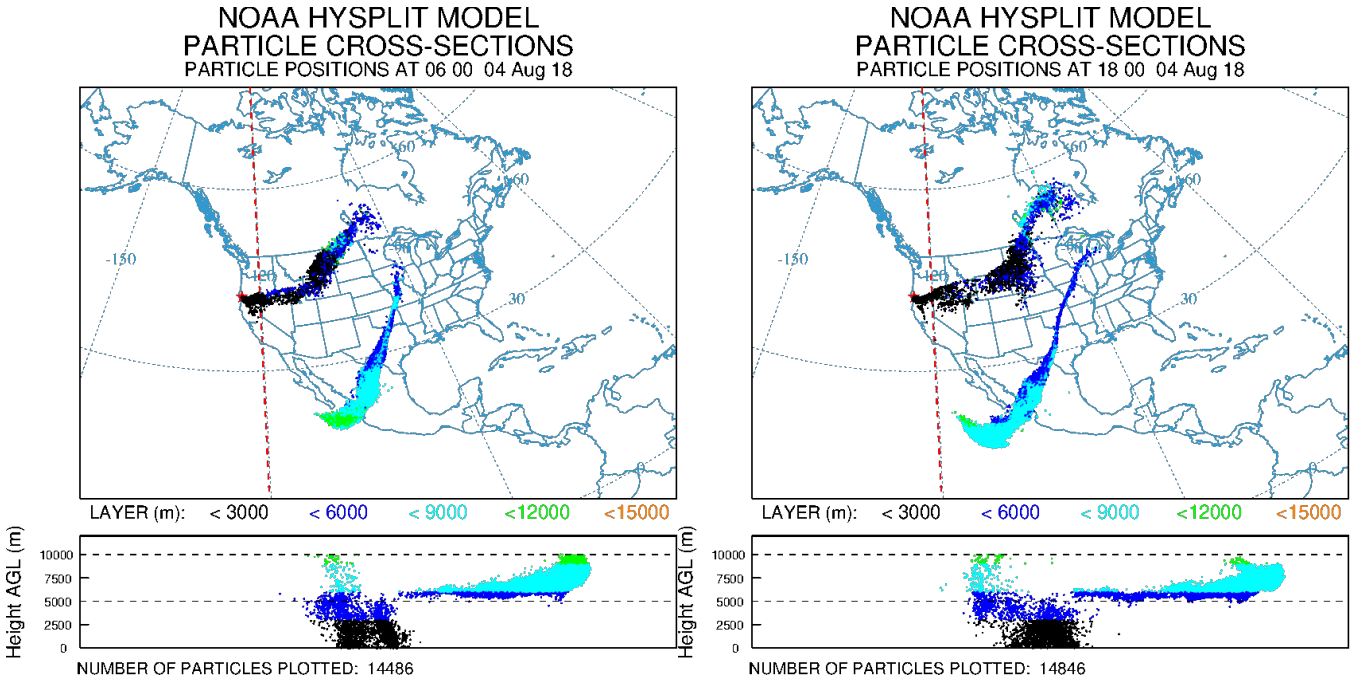
Low level smoke from the Klondike Fire (42.369N, 123.86W) pooled across southern Oregon and northern California from August 5 to August 6. By midday on August 6, conditions shifted with smoke transported southward across western California and the central Valleys. Near-surface smoke reached the Red Hills area by late August 6 into early August 7. Smoke continued streaming southward through the region through August 9.


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 02 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 165

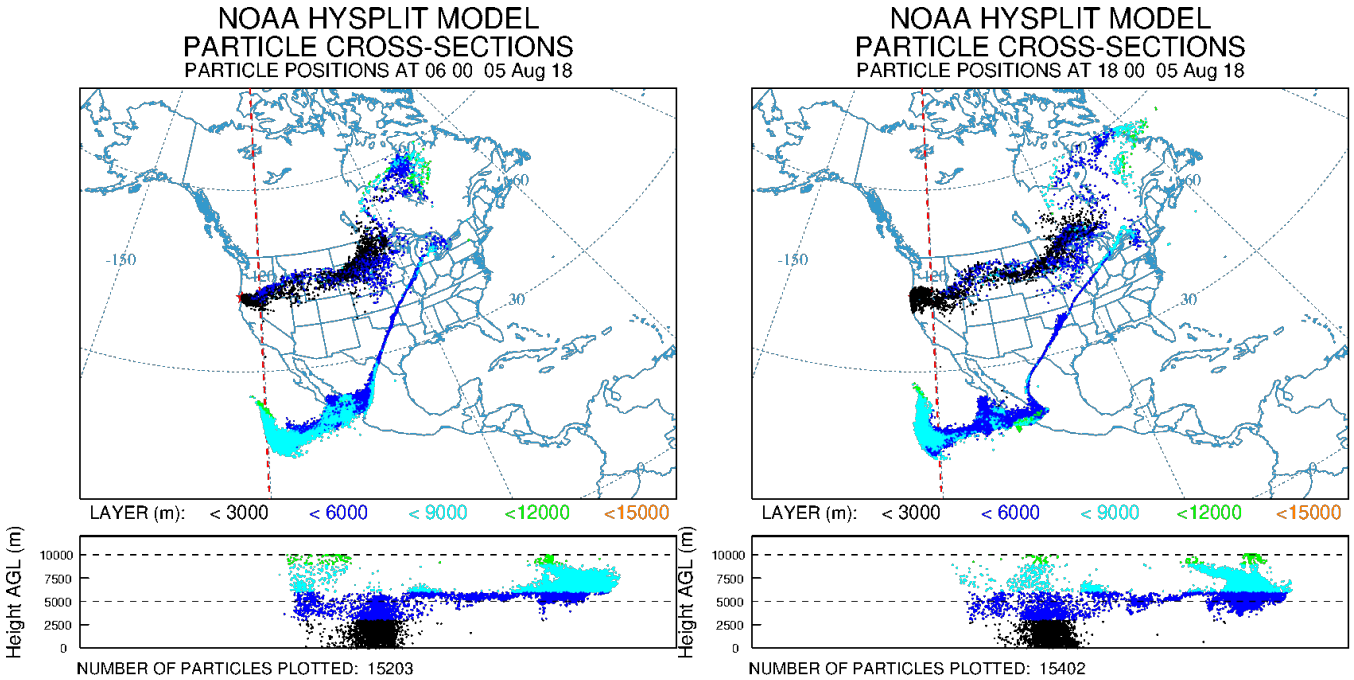

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 02 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 13644


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 03 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 13916

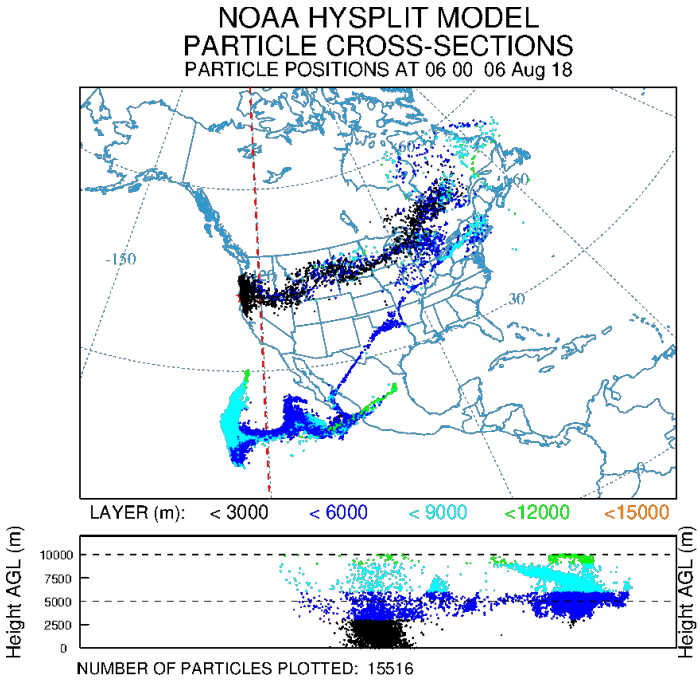

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 03 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 14177

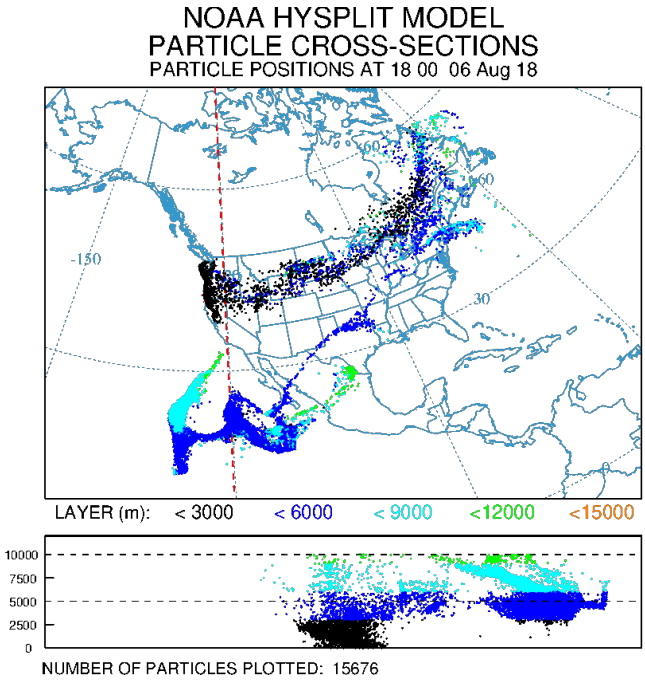

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 04 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 14486

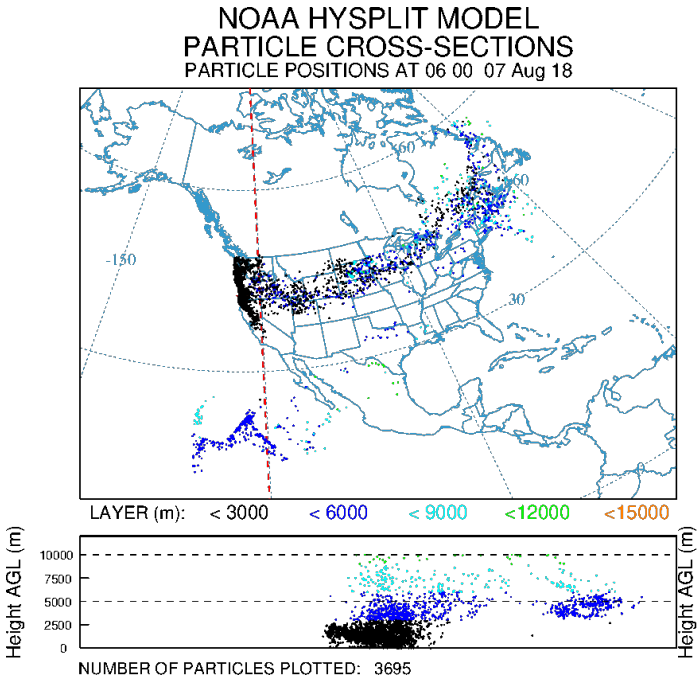
NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 04 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 14846

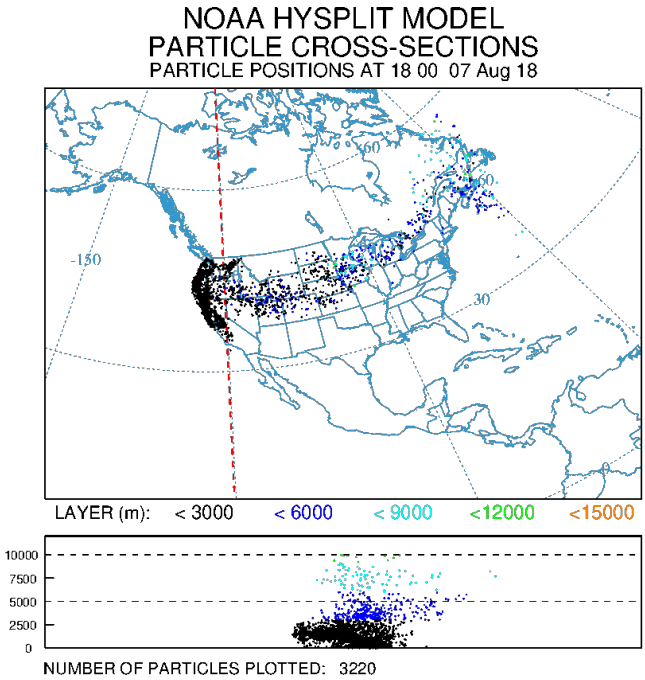

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 05 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 15203

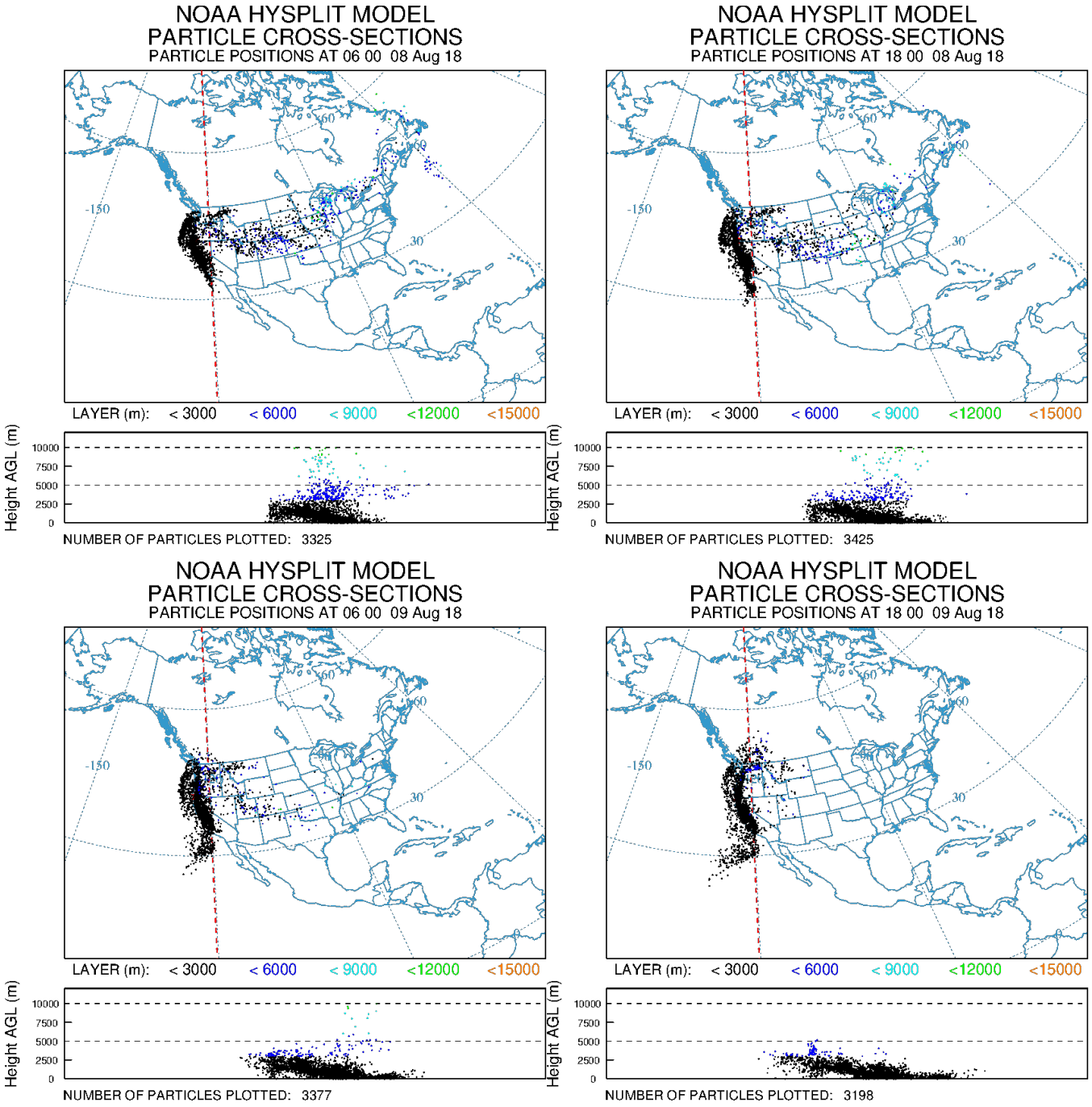
NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 05 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 15402


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 06 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 15516


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 06 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 15676


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 07 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 3695

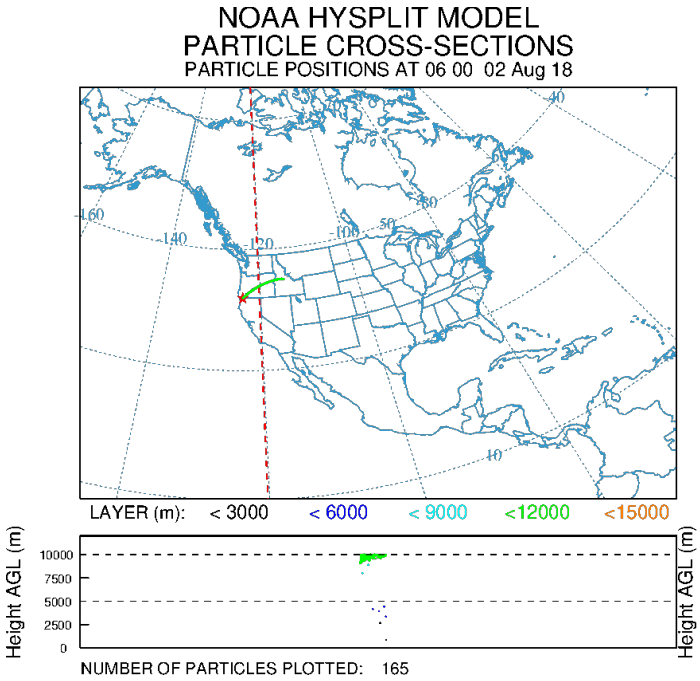

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 07 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 3220

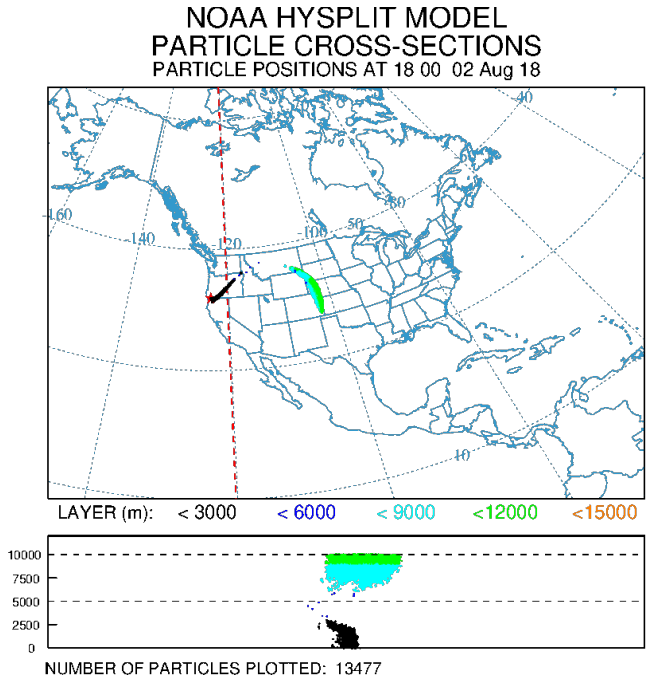


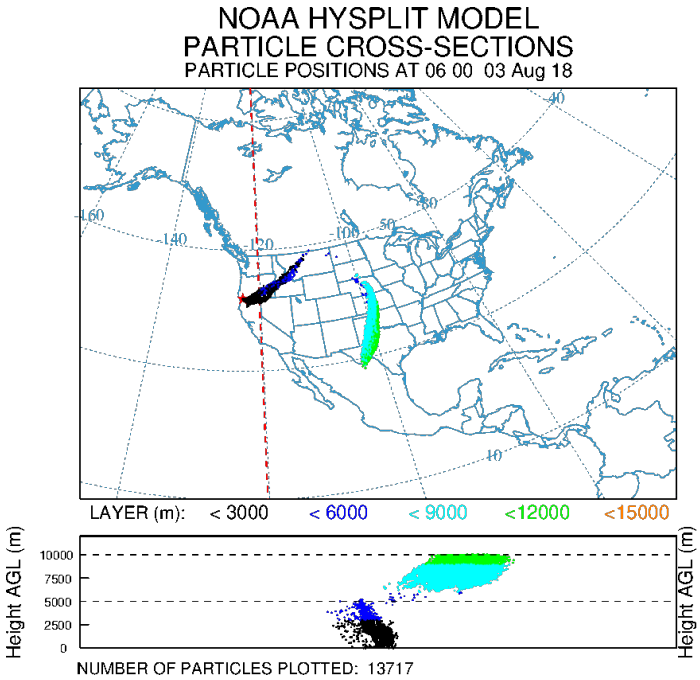
5. Natchez Fire

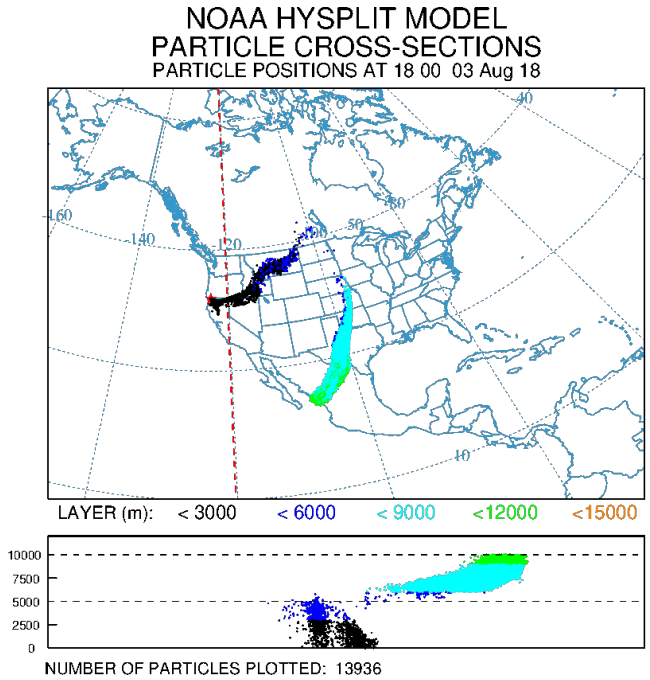
NOAA HYSPLIT Model (Gaseous Particles) with releases starting 02/0000 UTC. Model results below shown at 12 hour intervals starting August 2, 2018 06UTC.

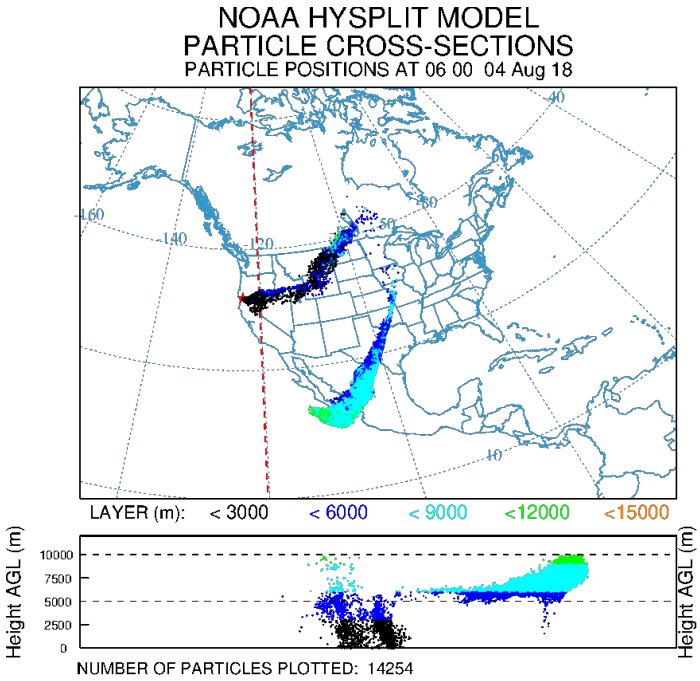
Conditions allowed low level smoke from the Natchez Fire (41.951W, 123.546N) to build up across southern Oregon and northern California on August 5. These conditions changed on August 6, when smoke was transported smoke southward across western California and reached the Red Hills area by late August 6 into early August 7. Smoke persisted across the San Joaquin Valley, with low level smoke likely impacting the Red Hills site through August 9.

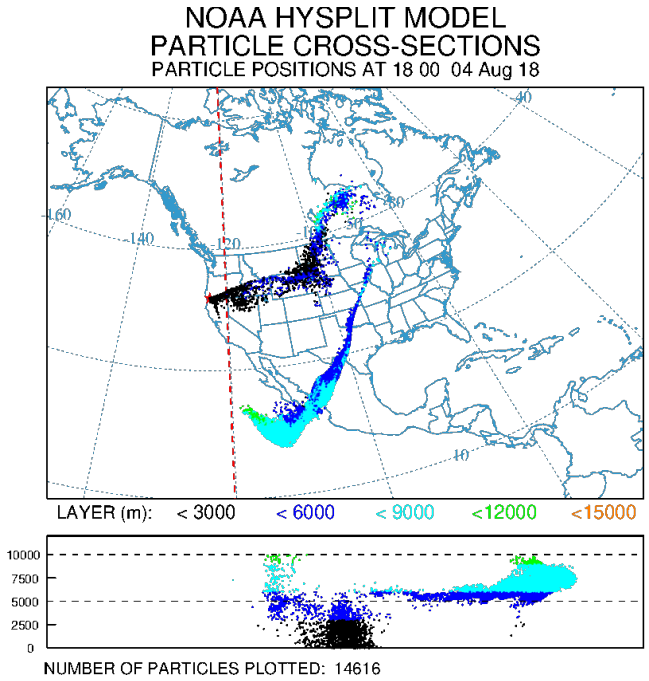

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 02 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 165

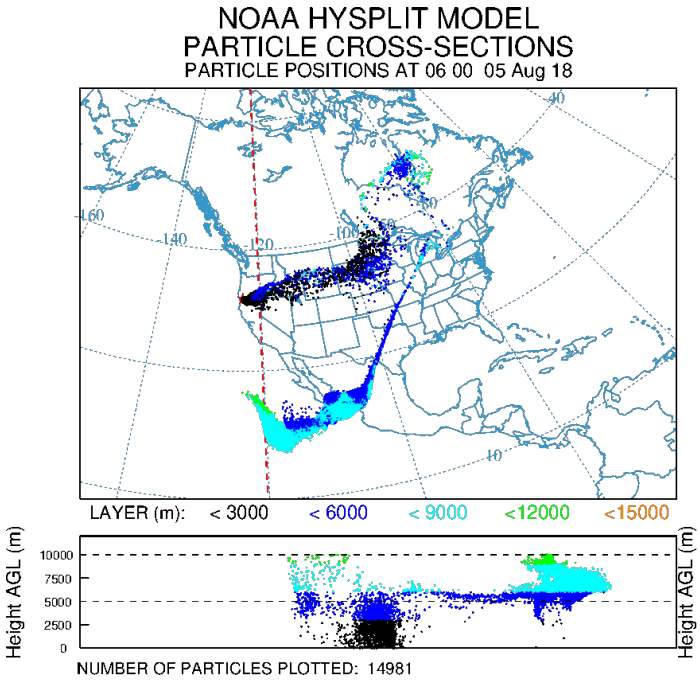

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 02 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 13477

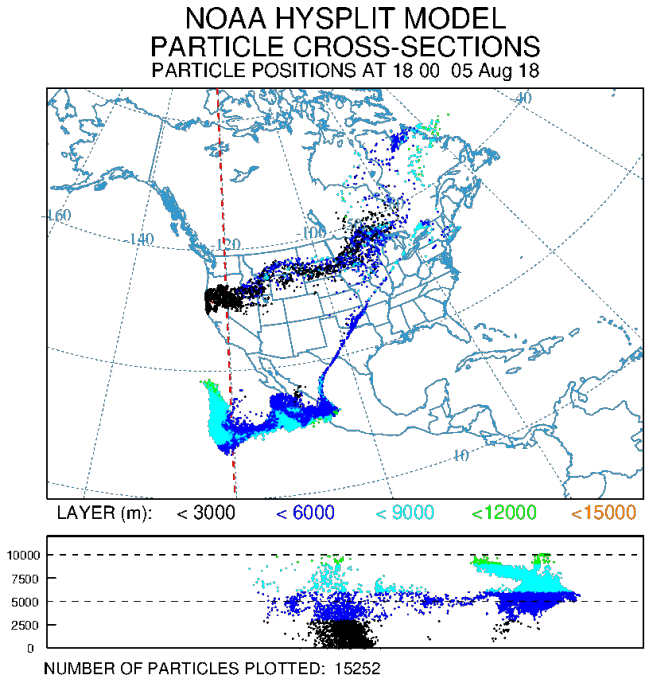

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 03 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 13717

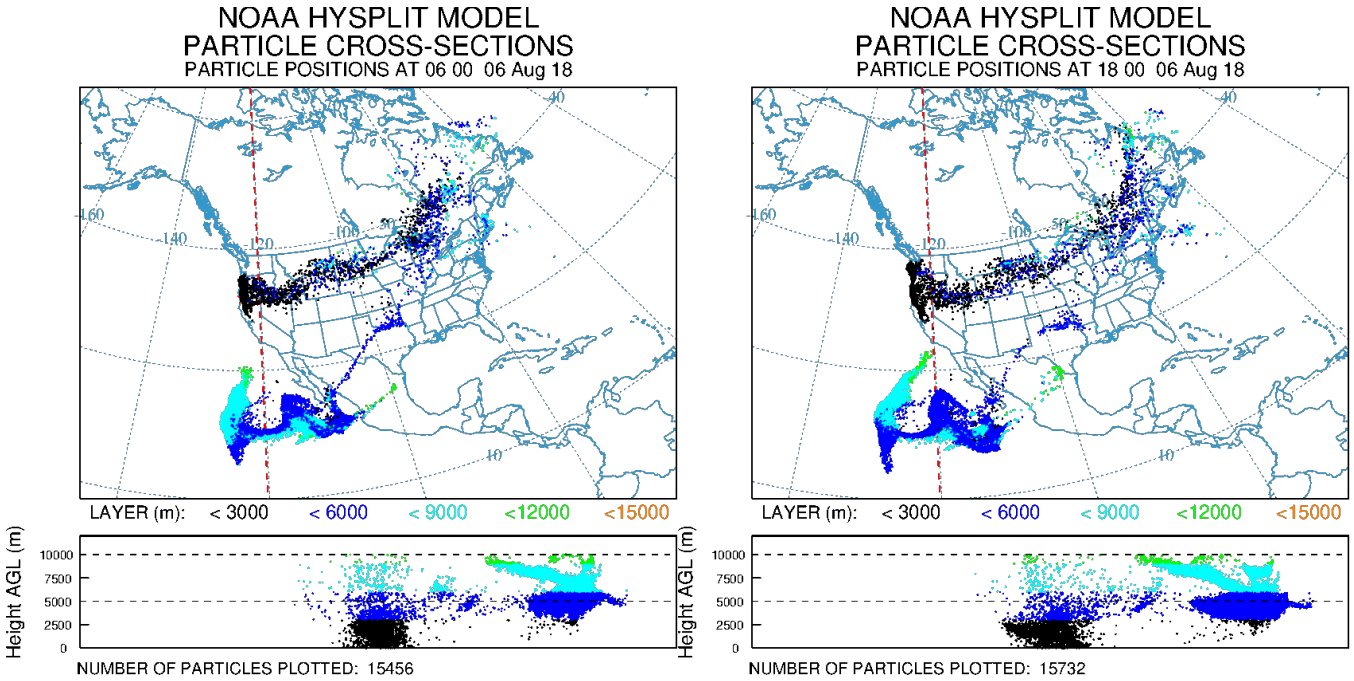

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 03 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 13936


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 04 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 14254

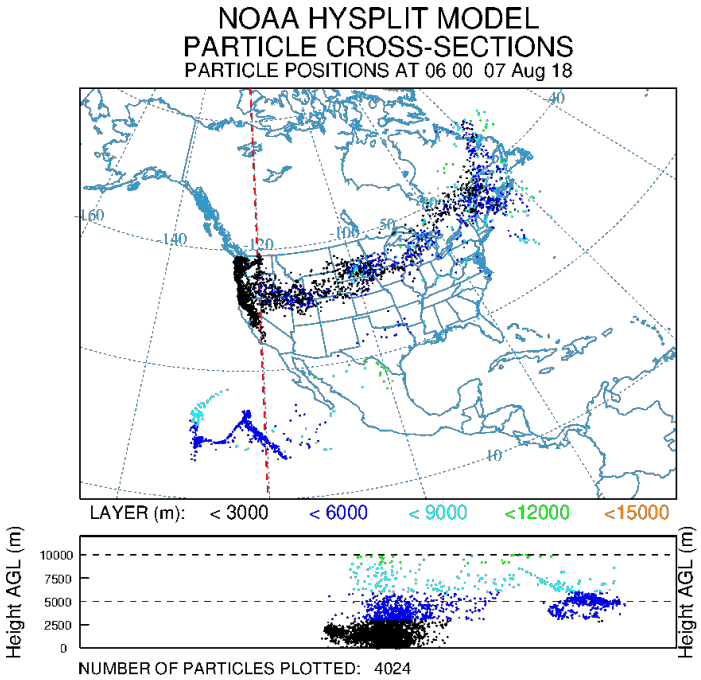

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 04 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 14616

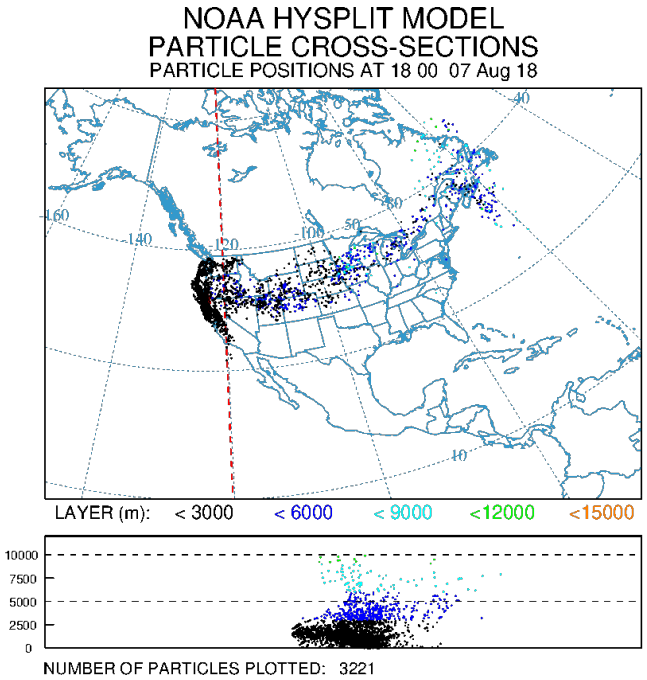

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 05 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 14981

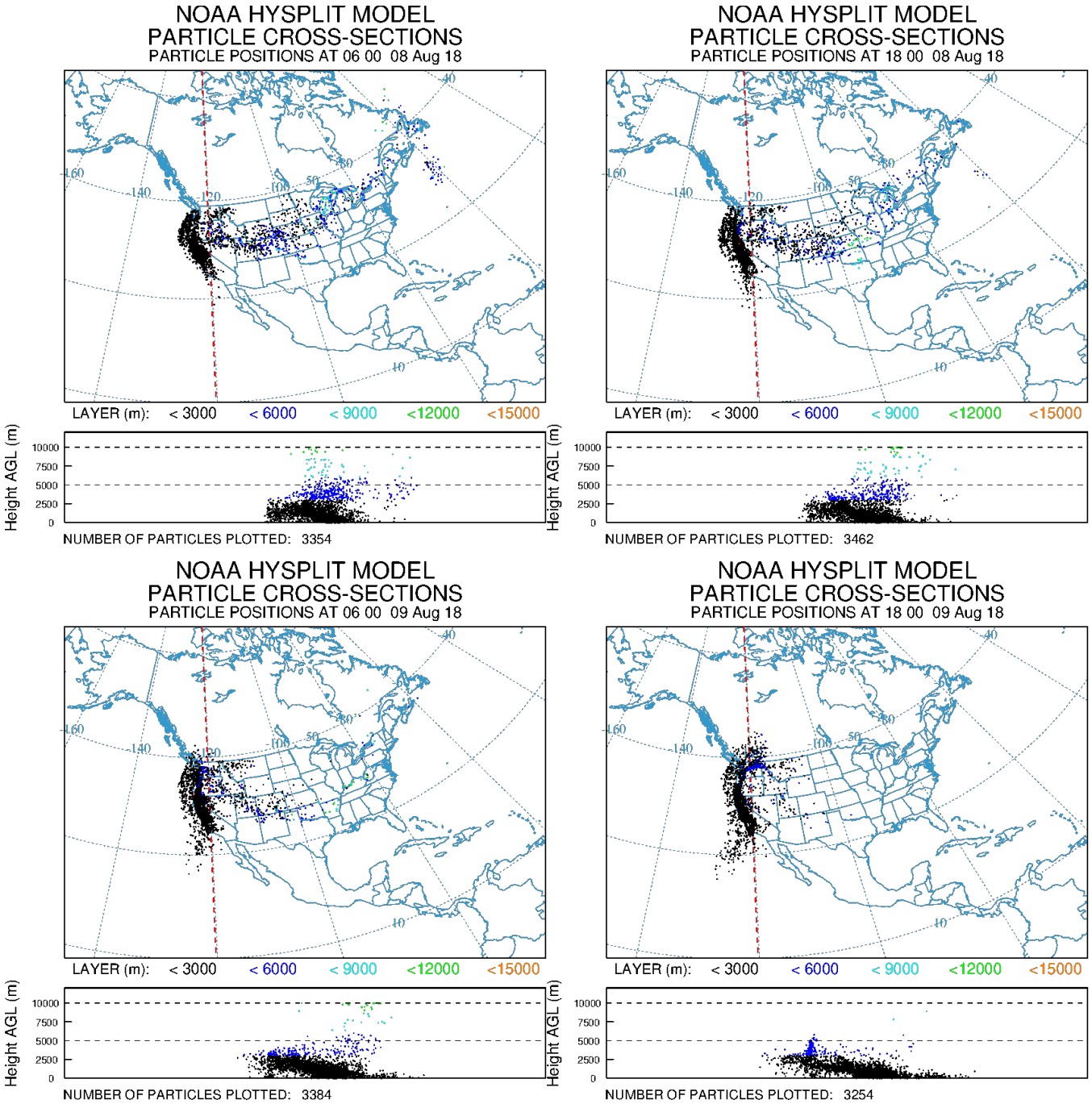

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 05 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 15252


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 06 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 15456

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 06 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 15732


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 07 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 4024


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 07 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 3221

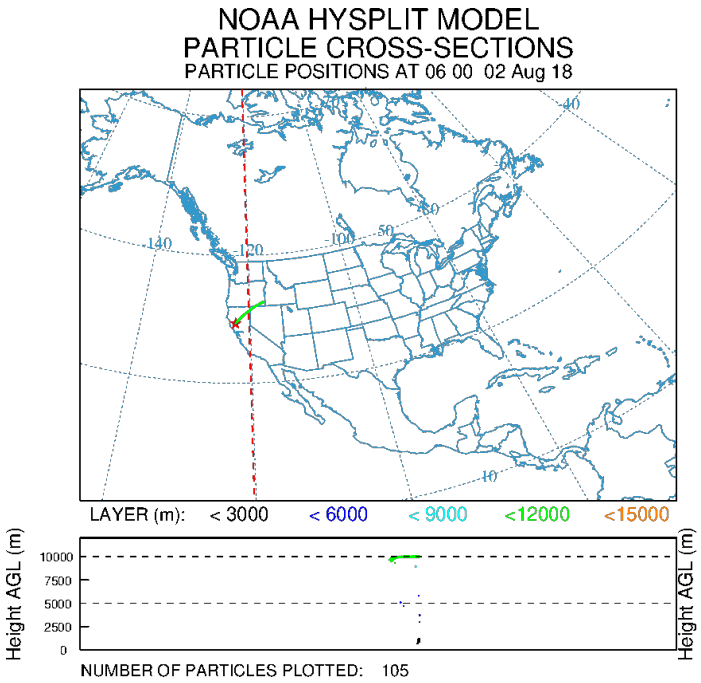


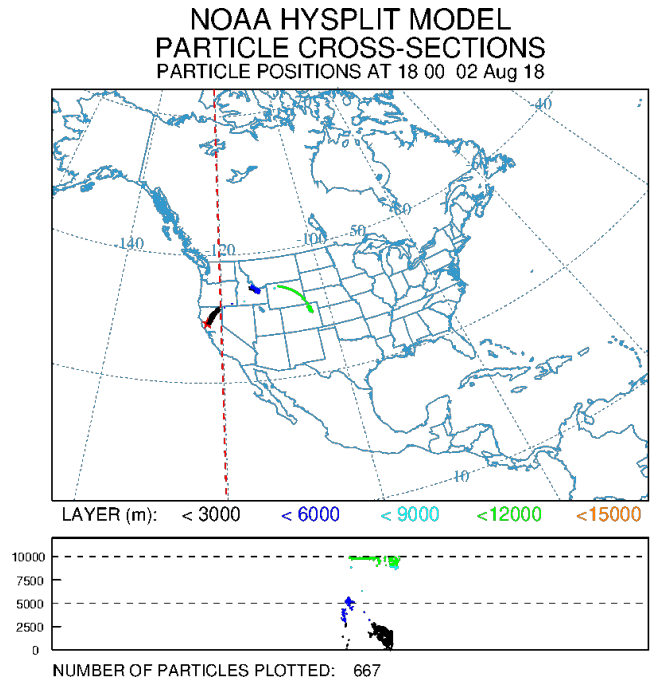
6. Ranch Fire (Mendocino Complex)

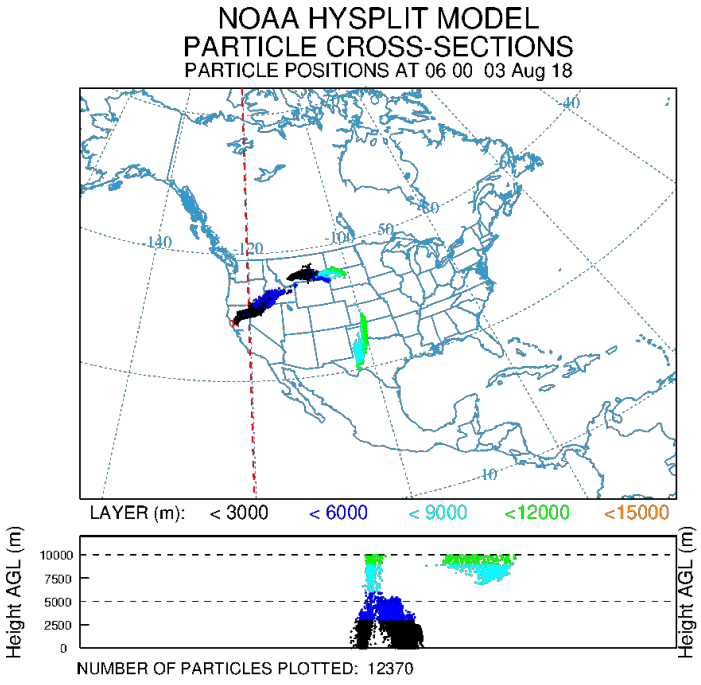
NOAA HYSPLIT Model (Gaseous Particles) with releases starting 02/0000 UTC. Model results below shown at 12 hour intervals starting August 2, 2018 06UTC.

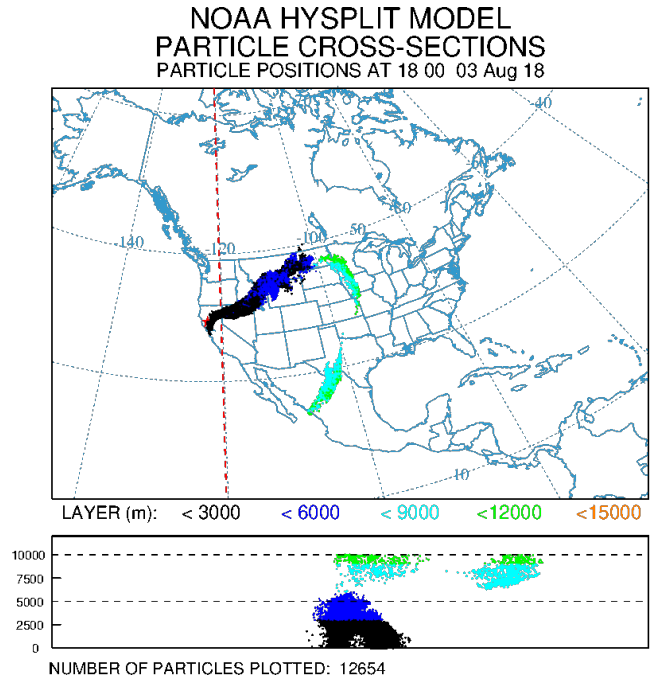
Smoke from the Ranch Fire (39.243W, 123.103N) flowed primarily northeast and eastward across northern California during August 2 and August 3. During August 3, conditions shifted allowing for some near-surface smoke to move southward along the Coastal Range, reaching the Red Hills area and western San Joaquin Valley by late August 3 into early August 4. Smoke from the Ranch Fire appeared to decrease late August 4 before resurging into the

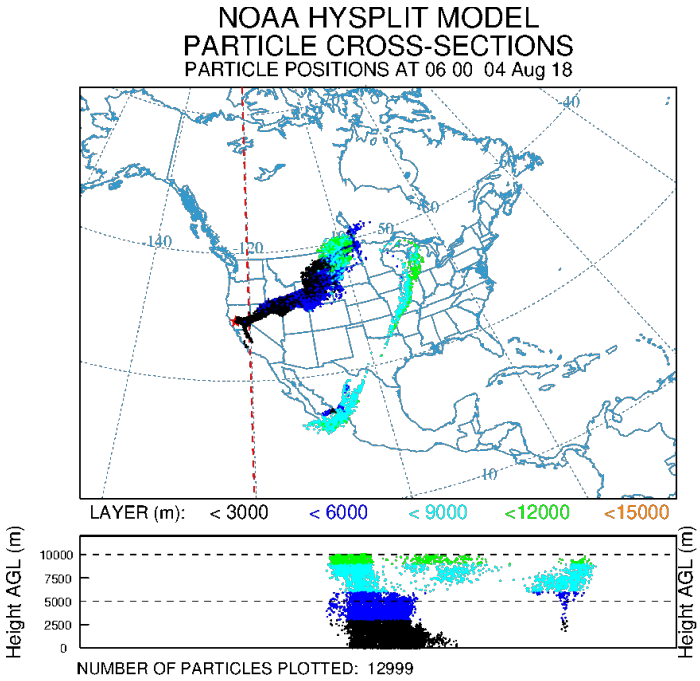
region again on August 6. Smoke continued to be transported across the Red Hills area through August 9.

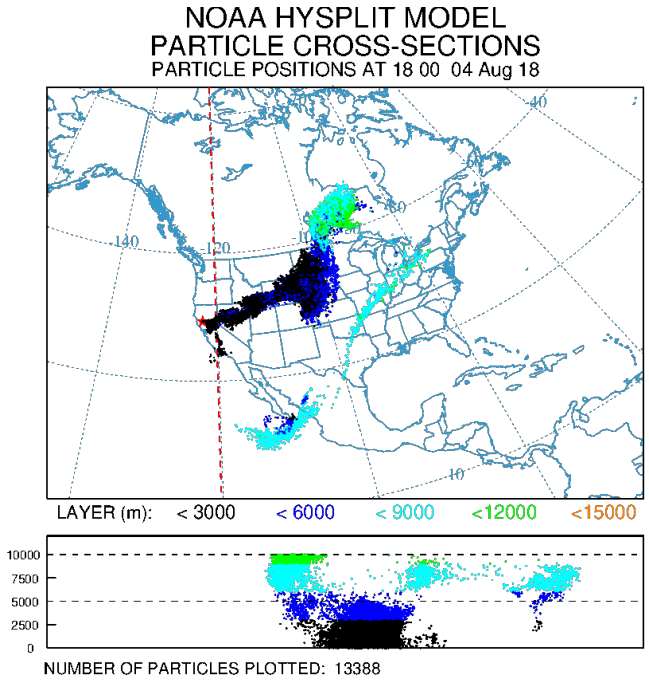


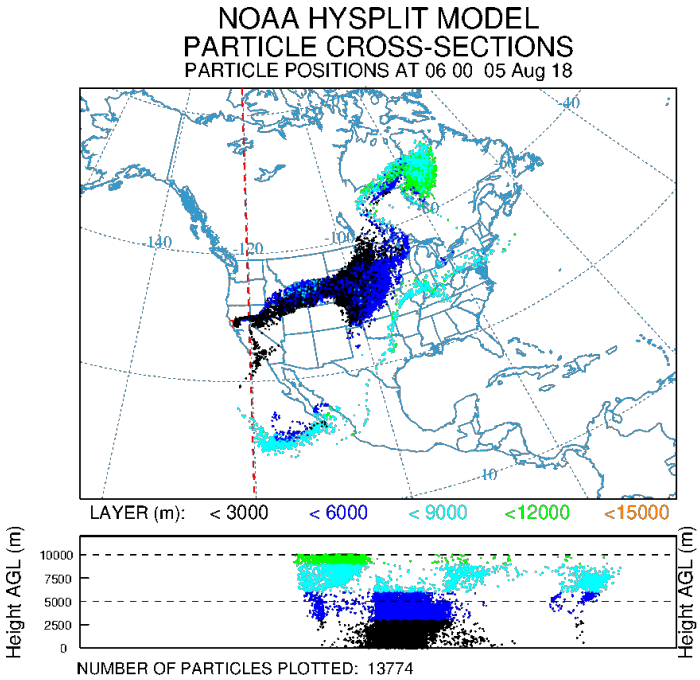


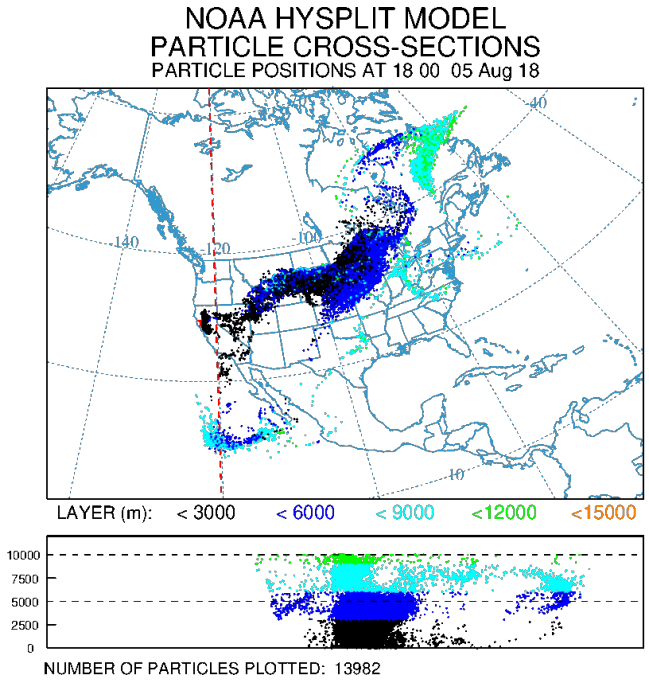


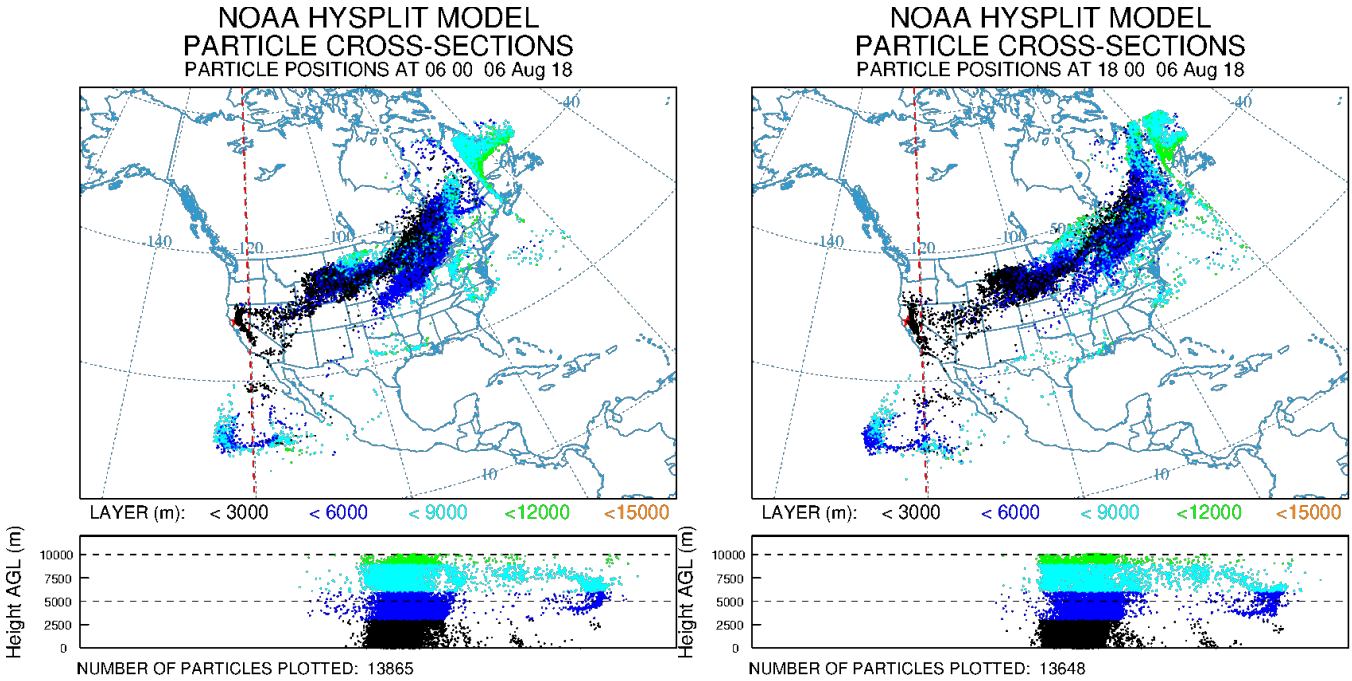



NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 04 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 12999

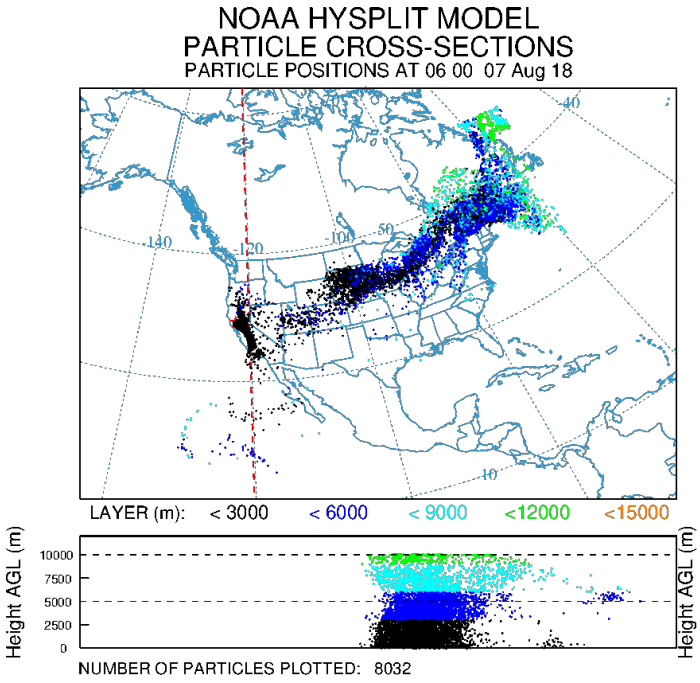

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 04 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 13388

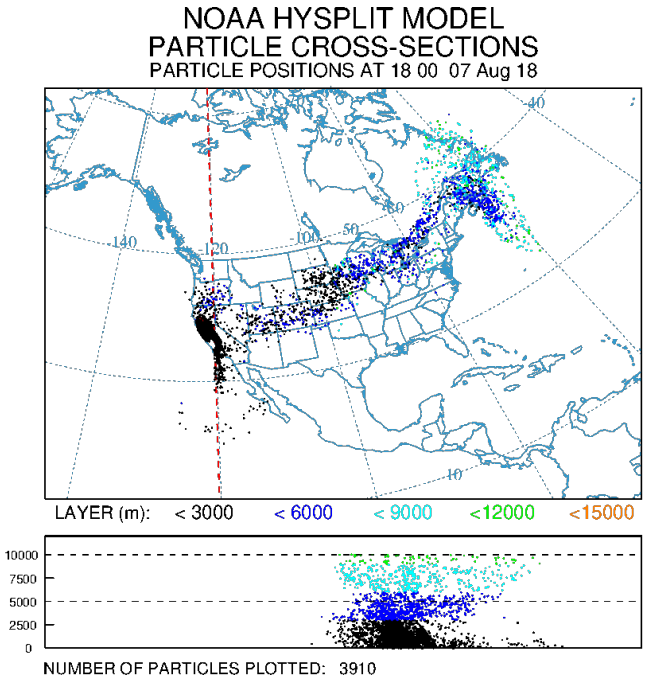

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 05 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 13774

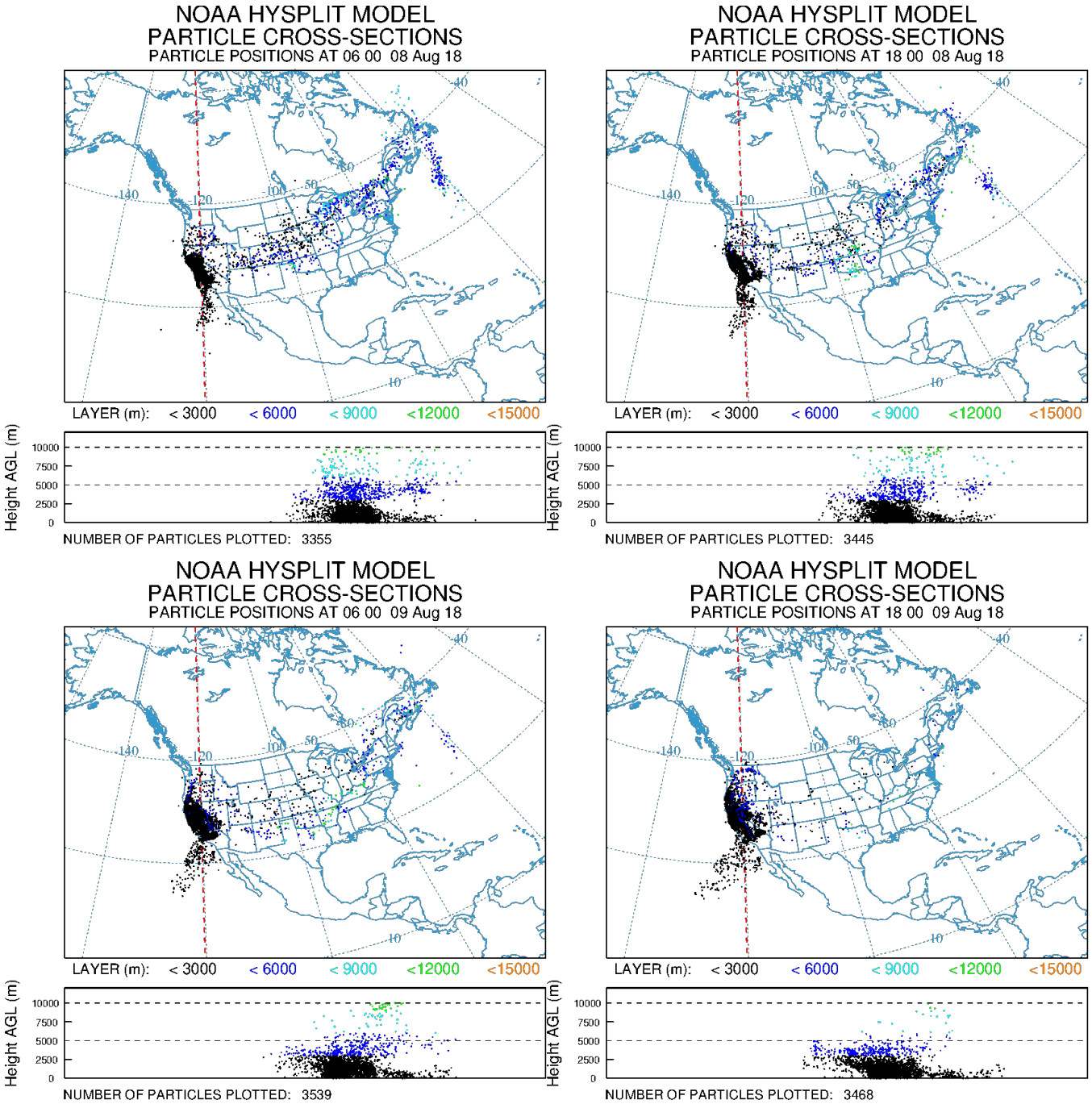

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 05 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 13982


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 06 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 13865

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 06 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 13648


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 07 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 8032


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 07 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 3910

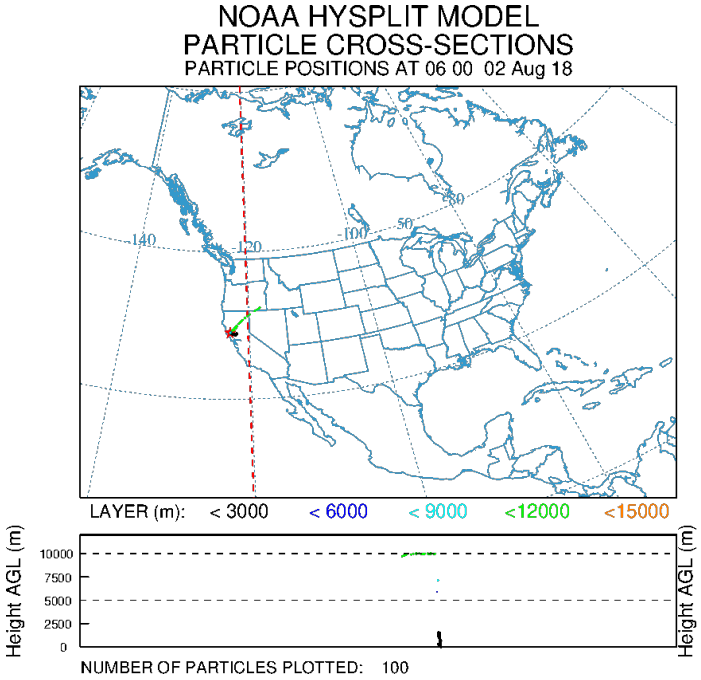


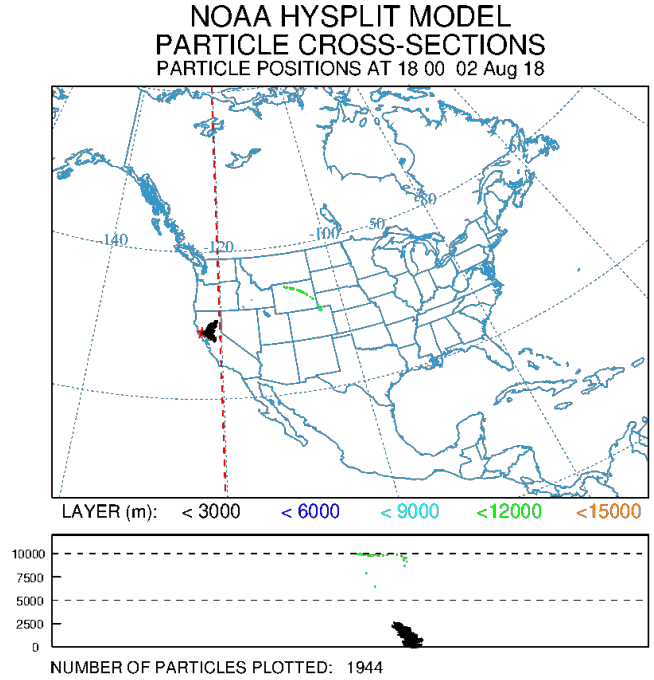
7. River Fire (Mendocino Complex)

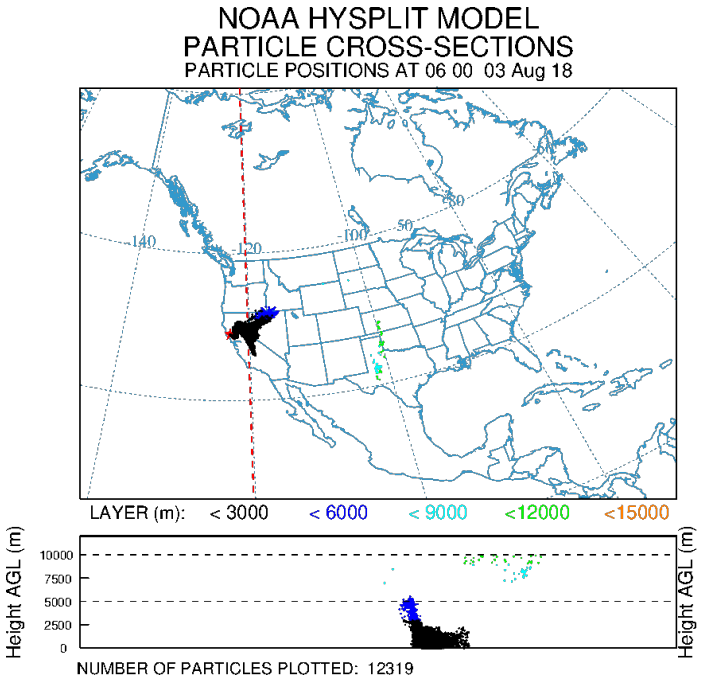
NOAA HYSPLIT Model (Gaseous Particles) with releases starting 02/0000 UTC. Model results below shown at 12 hour intervals starting August 2, 2018 06UTC.

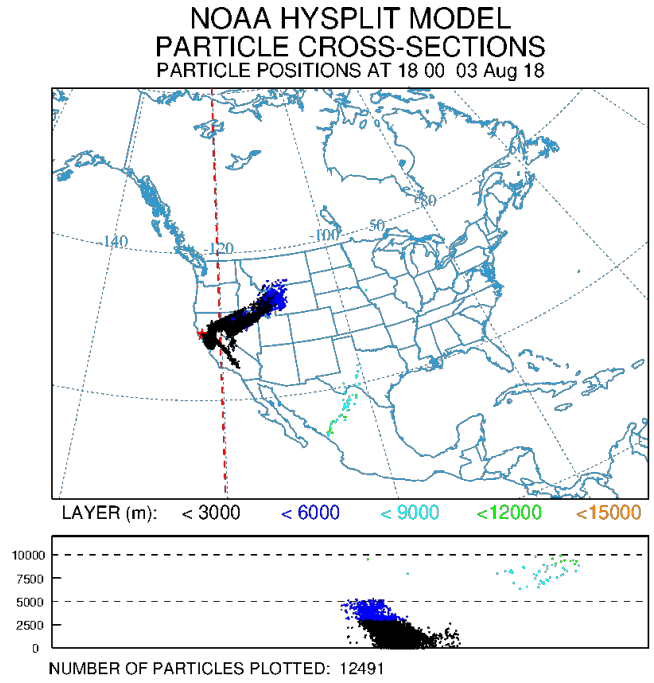
Low level smoke from the River Fire (39.047W, 123.120N) was transported into the central San Joaquin Valley on August 3rd then filled the western San Joaquin Valley and impacted the Red Hills site during late August 3 into early August 4. Smoke cleared south and eastward during late on August 4 into early August 5. Another surge of smoke streamed southward

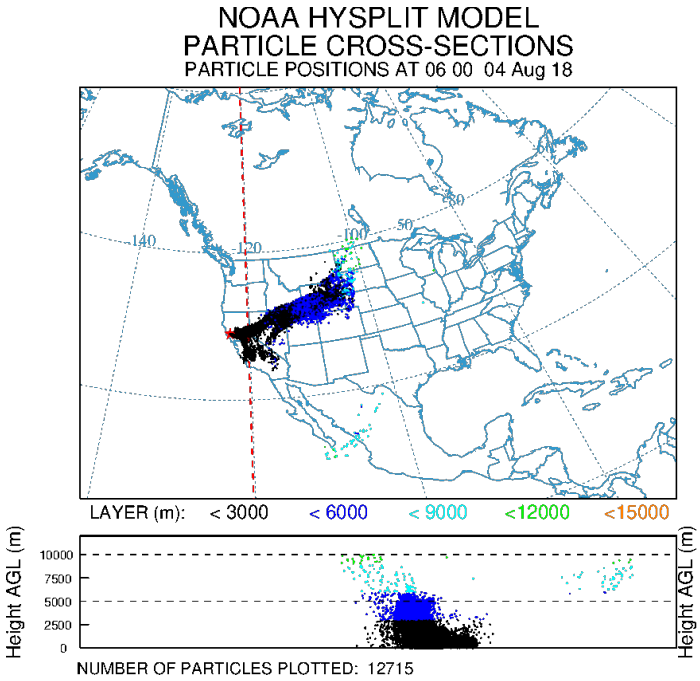
along the southern Coastal Range, reaching the Red Hills area on August 6. Low level smoke persisted across the region through August 9.

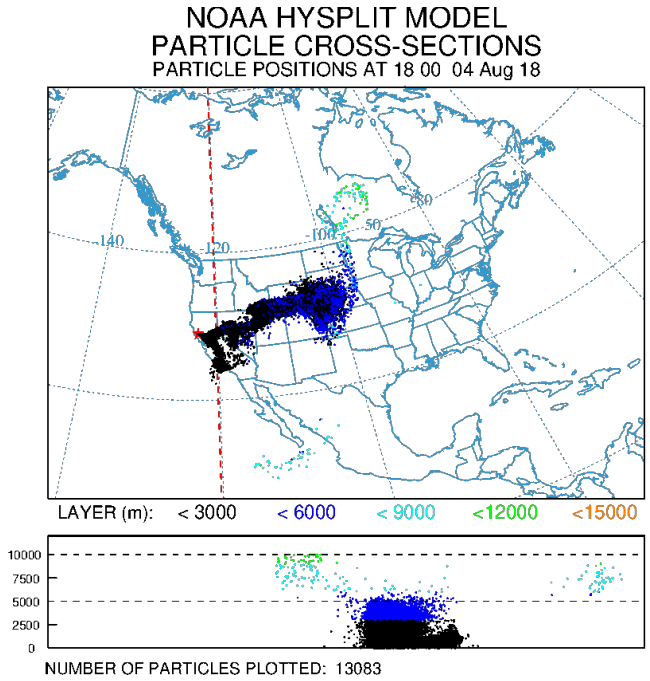


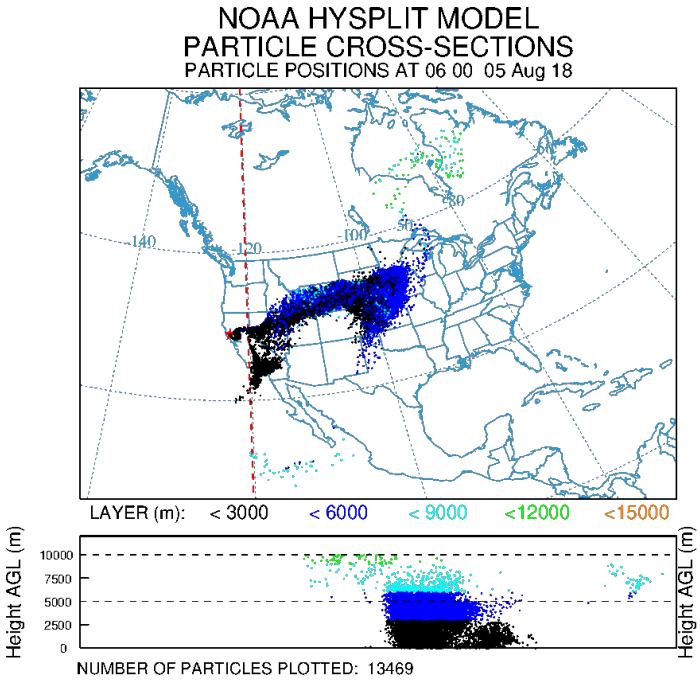


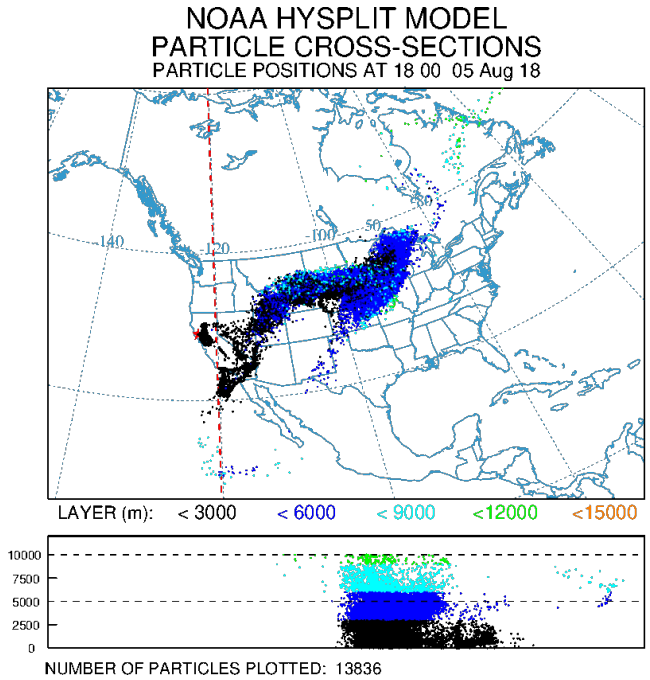


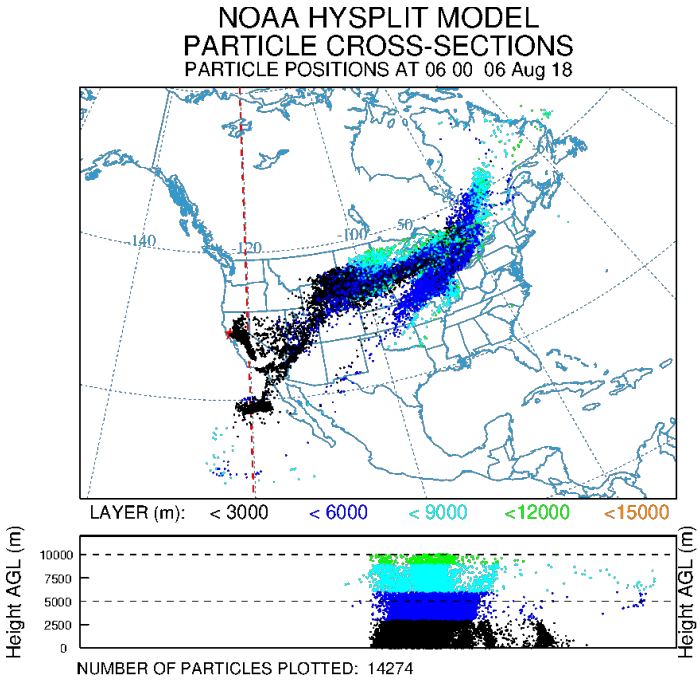


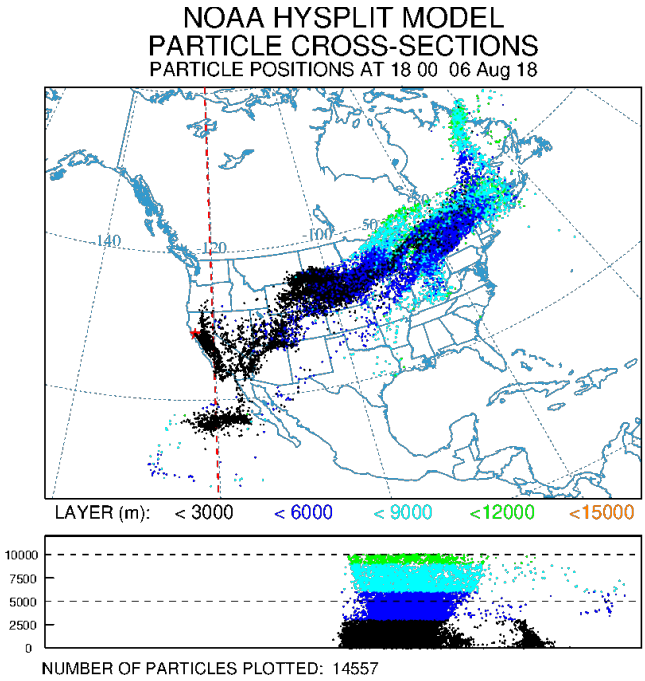

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 04 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 12715

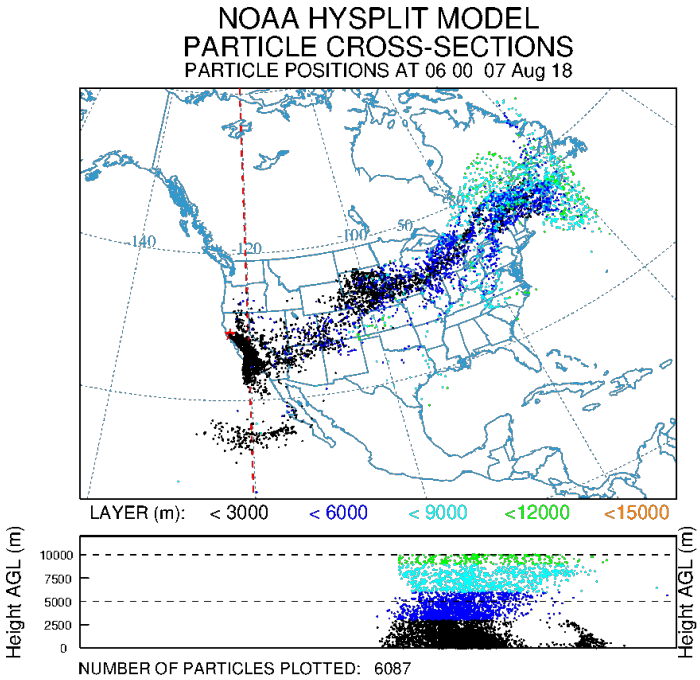

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 04 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 13083

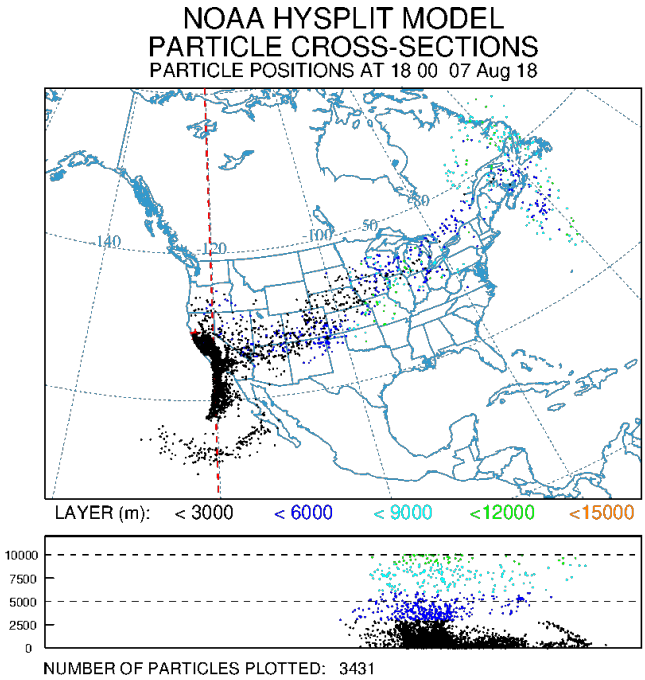

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 05 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 13469

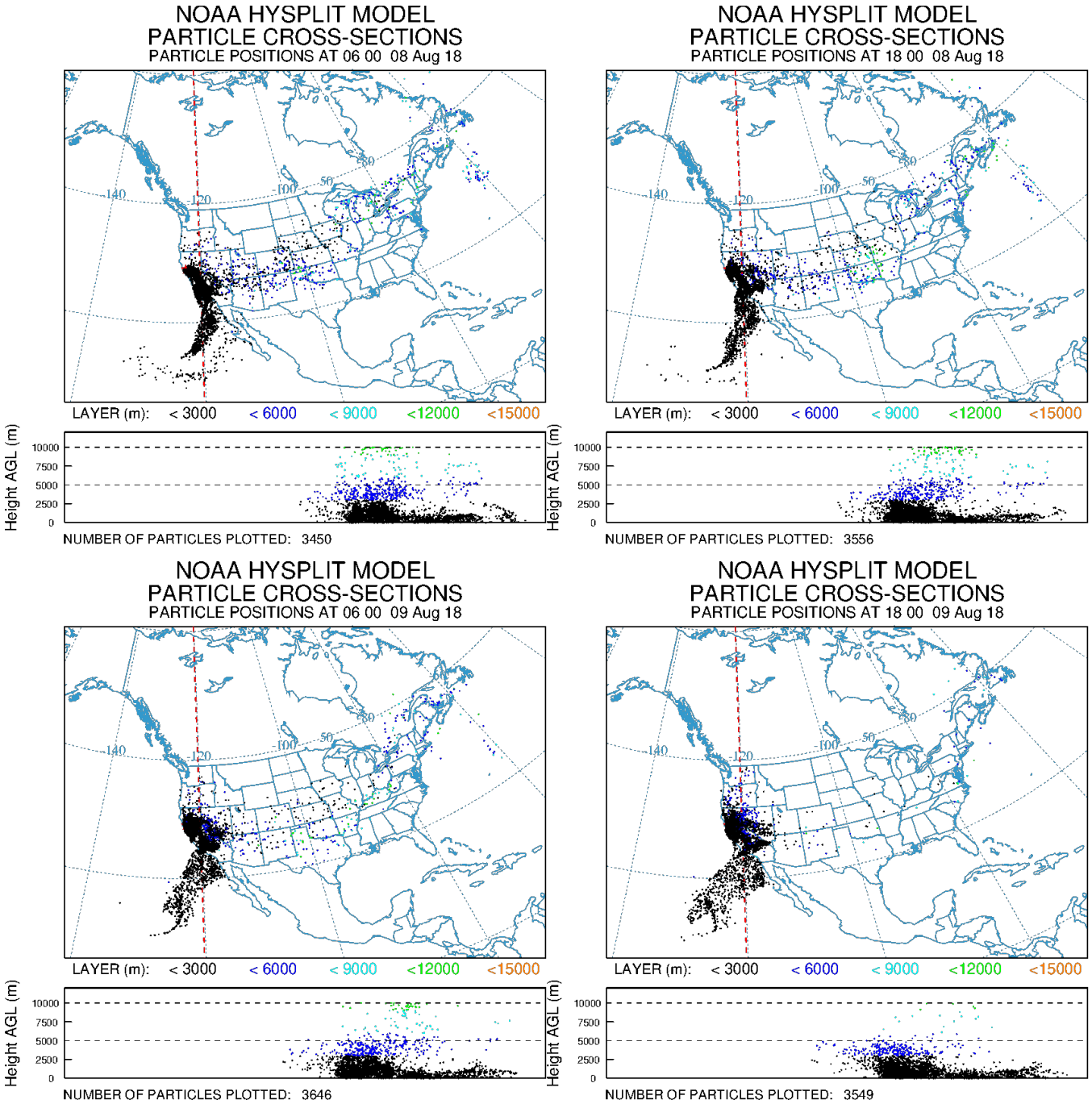

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 05 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 13836


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 06 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 14274


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 06 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 14557


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 07 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 6087

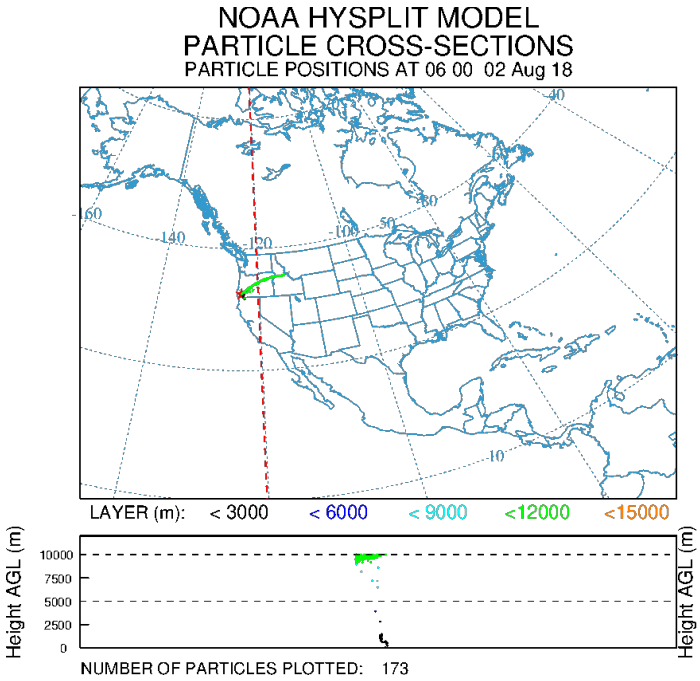

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 07 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 3431

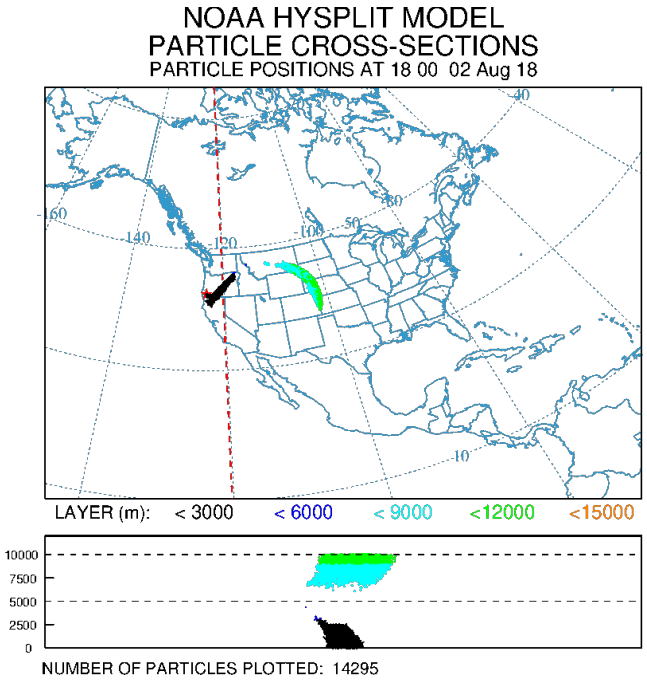


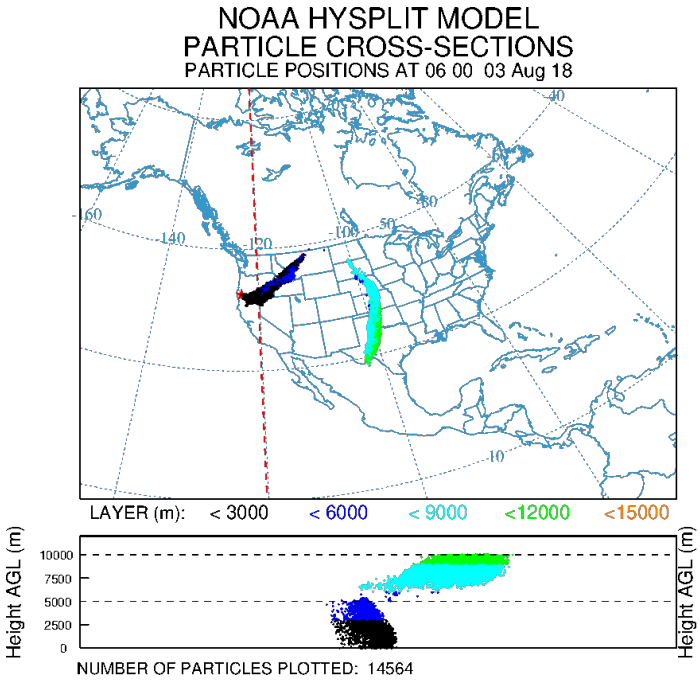
8. Taylor Creek Fire

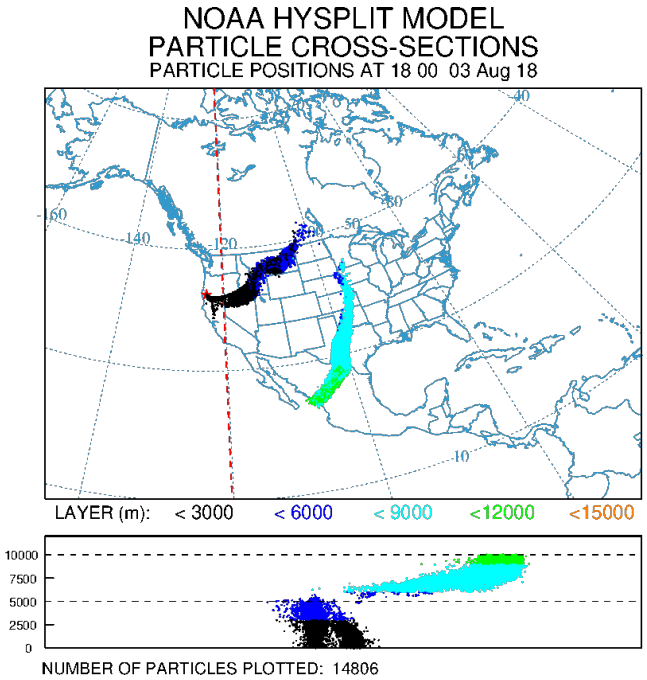
NOAA HYSPLIT Model (Gaseous Particles) with releases starting 02/0000 UTC. Model results below shown at 12 hour intervals starting August 2, 2018 06UTC.

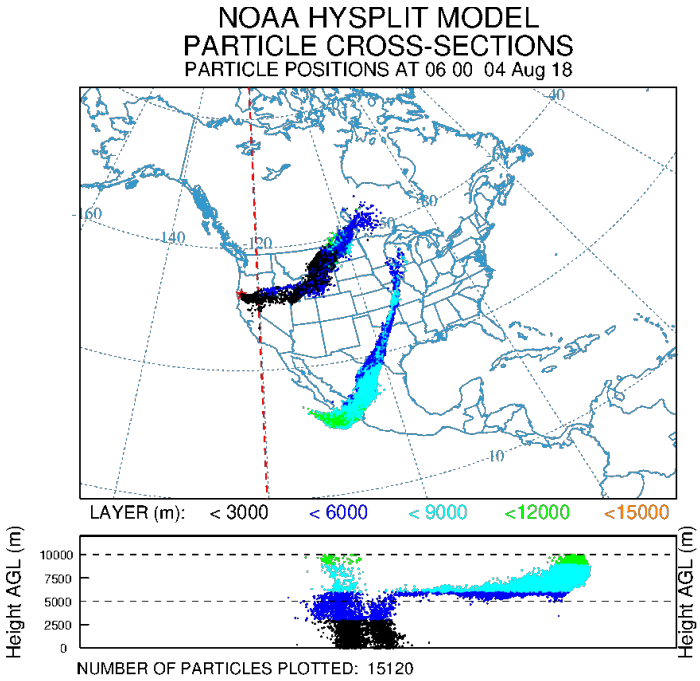
Wildfire smoke from the Taylor Creek Fire (45.528W, 123.571N) built up across northern California during August 5 into early August 6. Conditions late on August 6 allowed for transport southward into the San Joaquin Valley, with smoke reaching the Red Hills site during early to midday August 7. Smoke influence persists across the region through August 9.

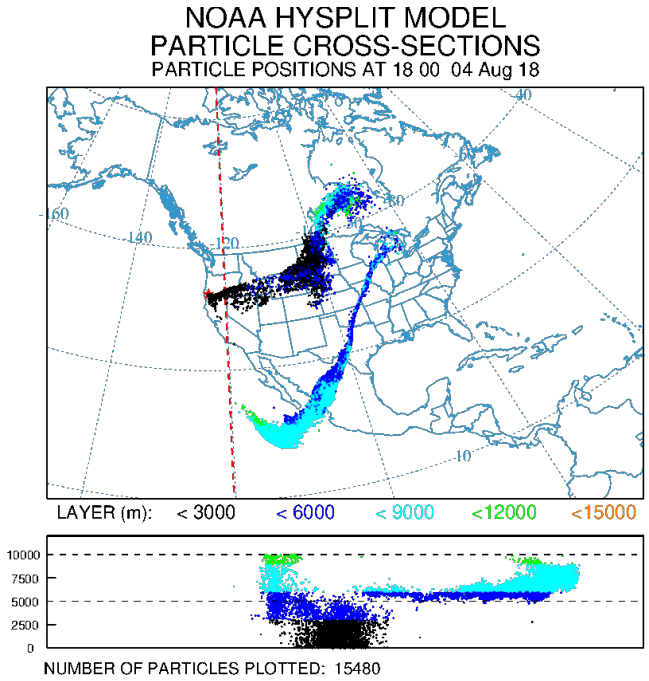

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 02 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 173

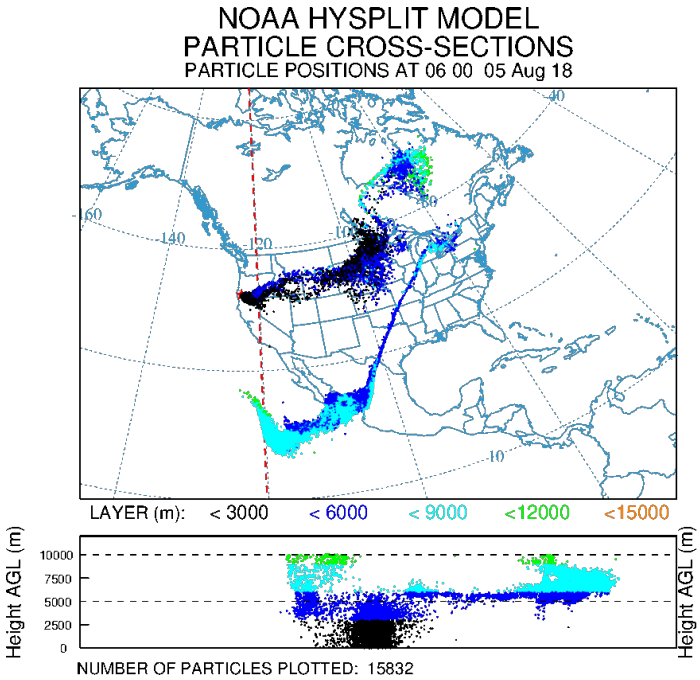

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 02 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 14295

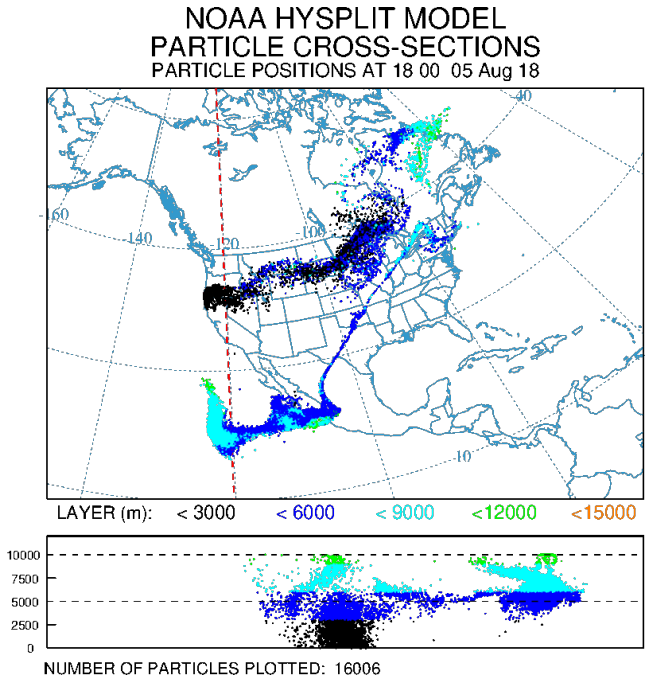

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 03 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 14564

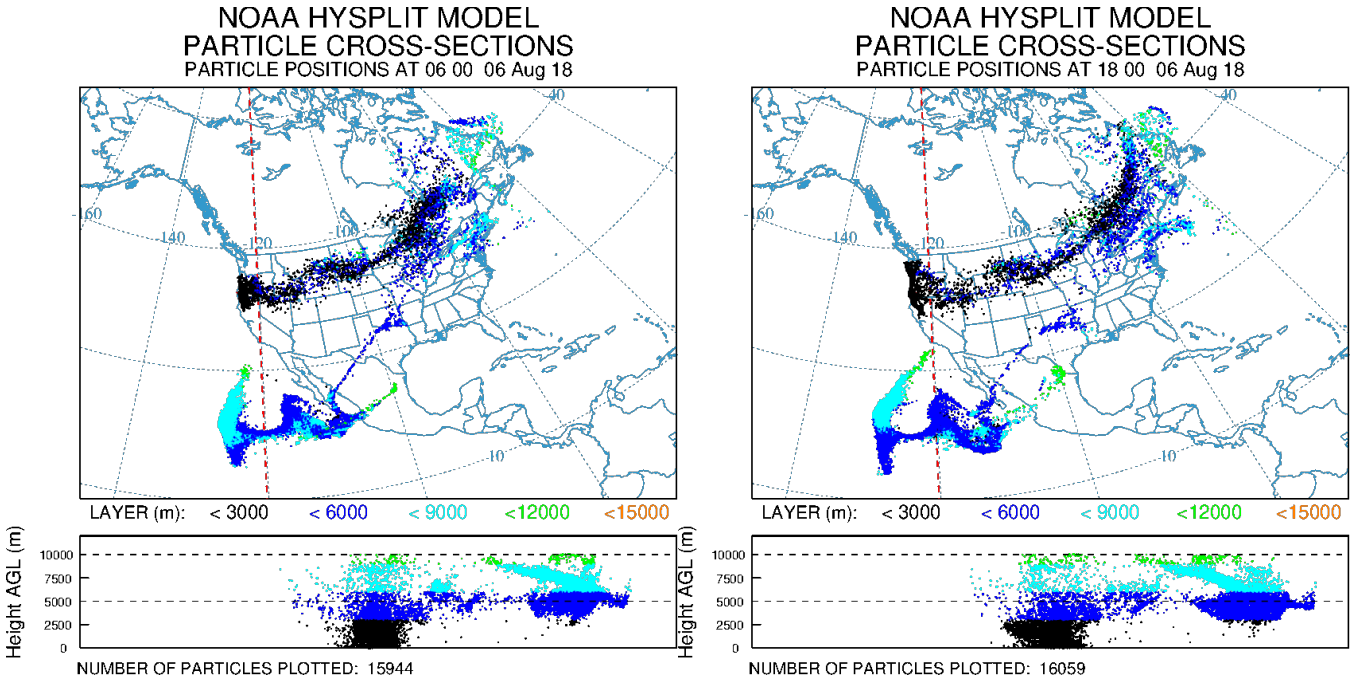

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 03 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 14806


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 04 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 15120

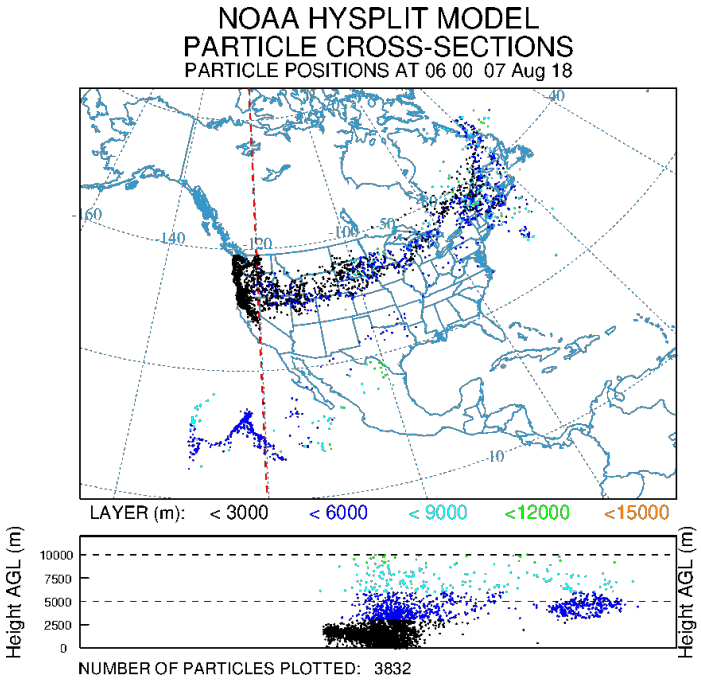

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 04 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 15480

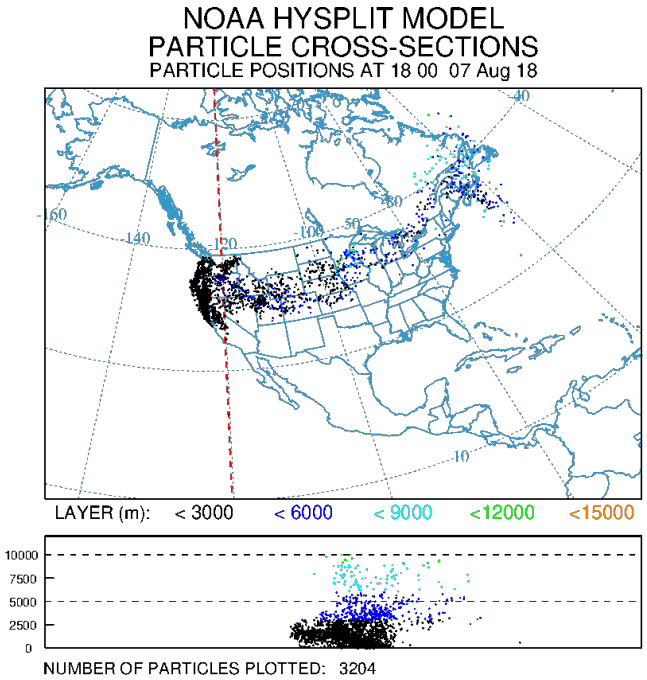

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 05 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 15832

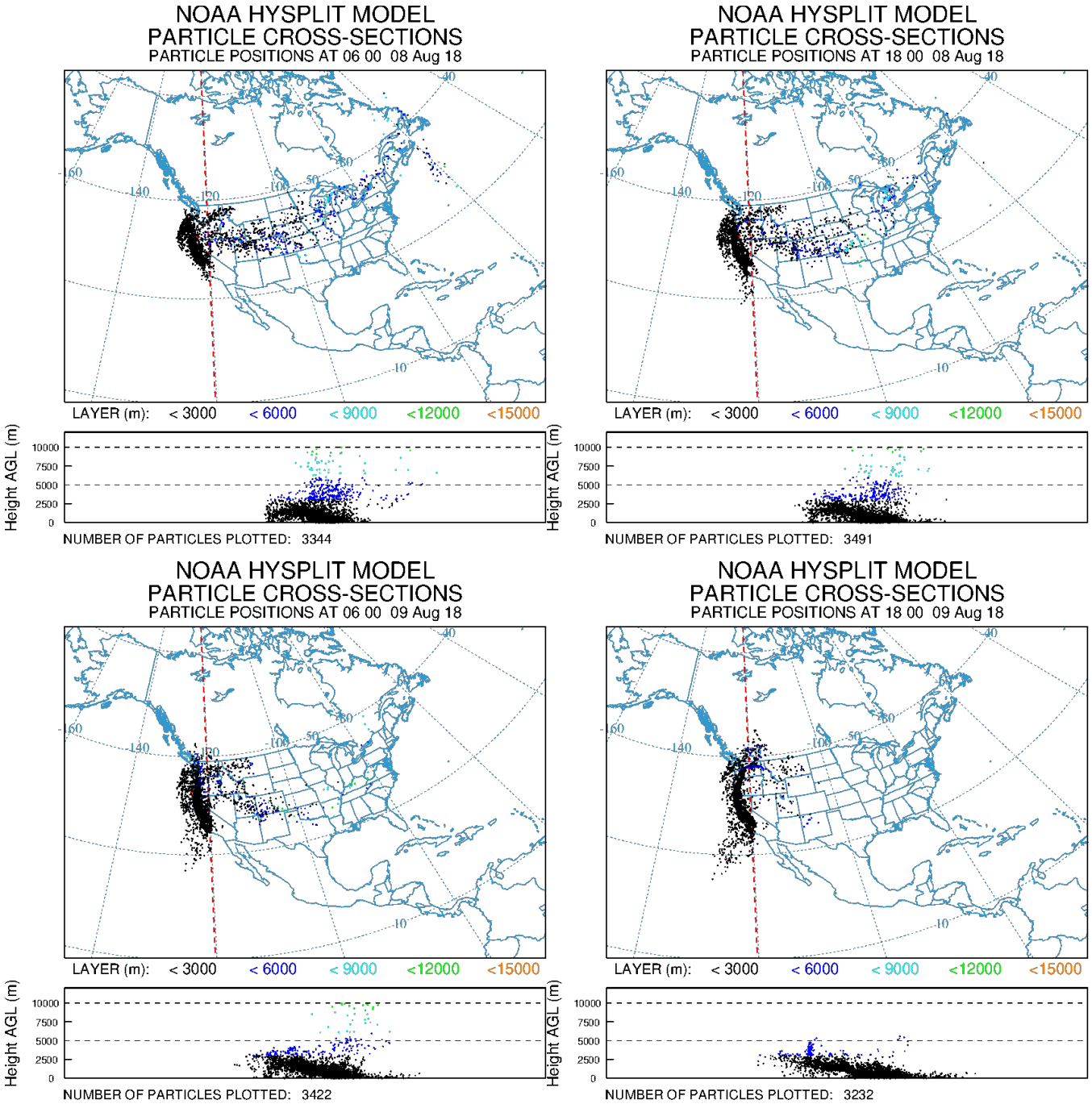

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 05 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 16006


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 06 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 15944

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 06 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 16059


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 06 00 07 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 3832


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 07 Aug 18
LAYER (m): < 3000 < 6000 < 9000 <12000 <15000
Height AGL (m)
10000
7500
5000
2500
0
NUMBER OF PARTICLES PLOTTED: 3204

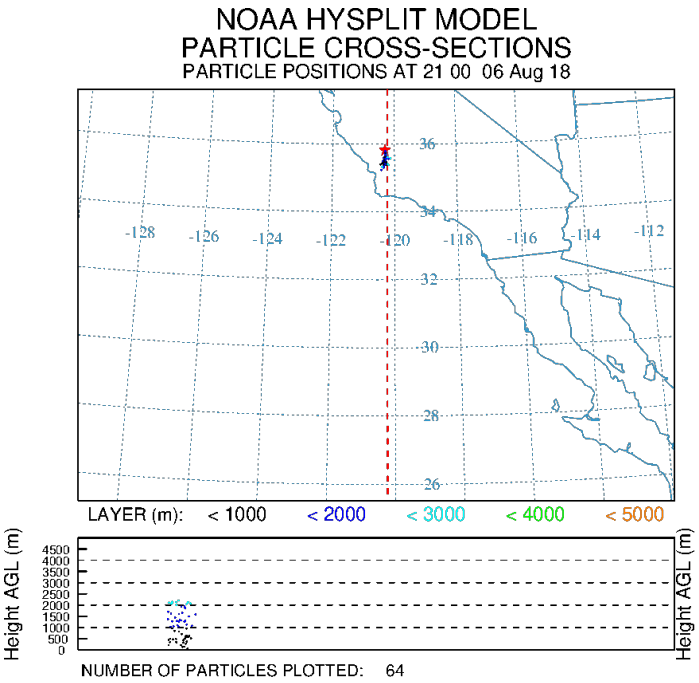


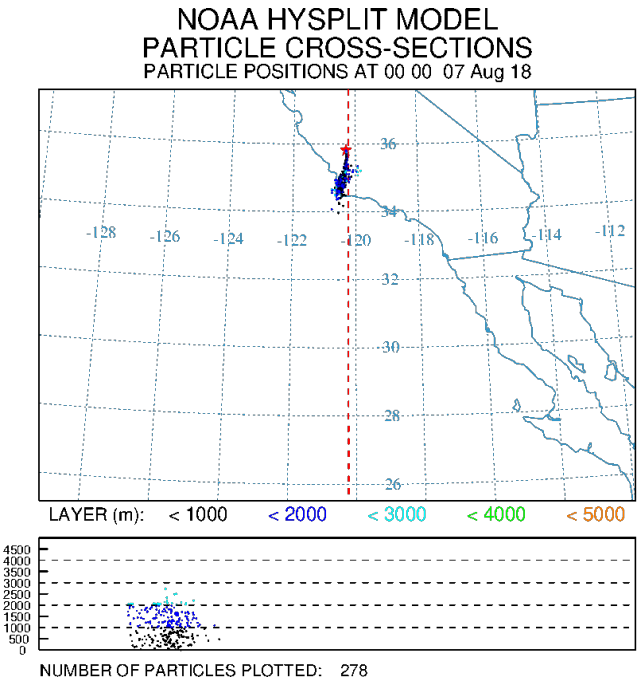
9. Turkey Fire

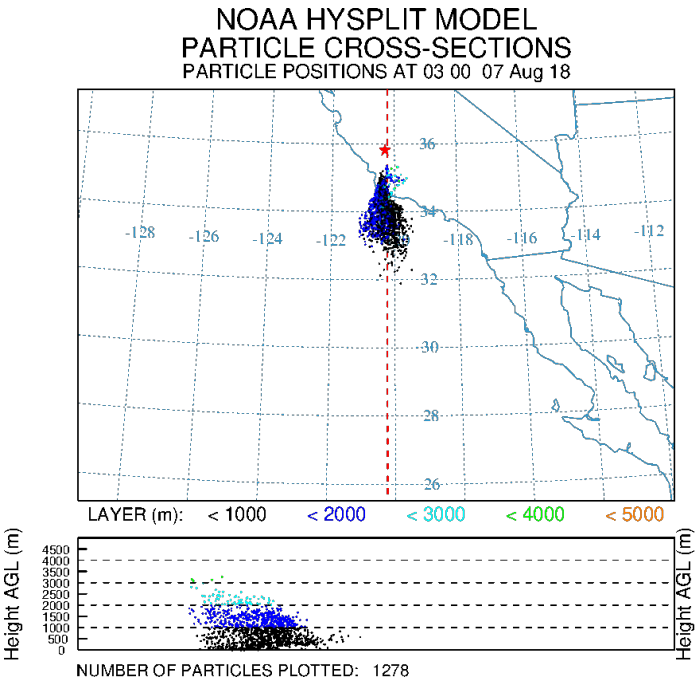
NOAA HYSPLIT Model (Gaseous Particles) with release at 06/1800 UTC for rough late morning estimation. 1 PUFF, NOT CONTINUOUS. Model results below shown at 3 hour intervals starting August 6, 2018 21UTC.

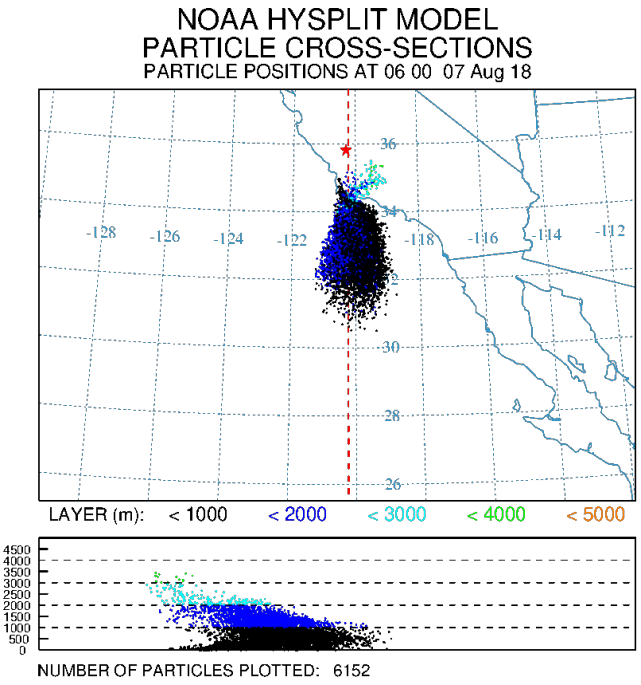
Model results at 3 hour intervals.

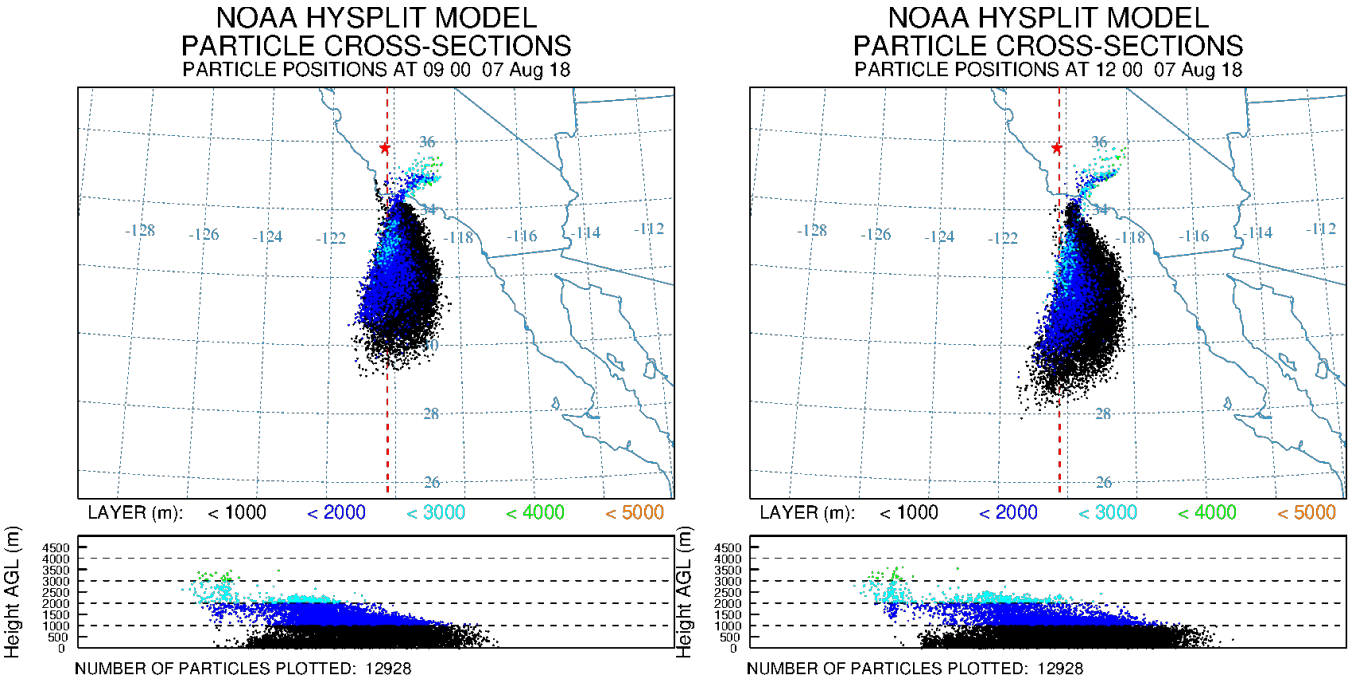
Smoke from the Turkey Fire (35.848W, 120.341N) blew southward to the Red Hills site 15 miles downwind. The site was directly impacted by wildfire smoke from a few hours after fire start time to a few hours after containment..



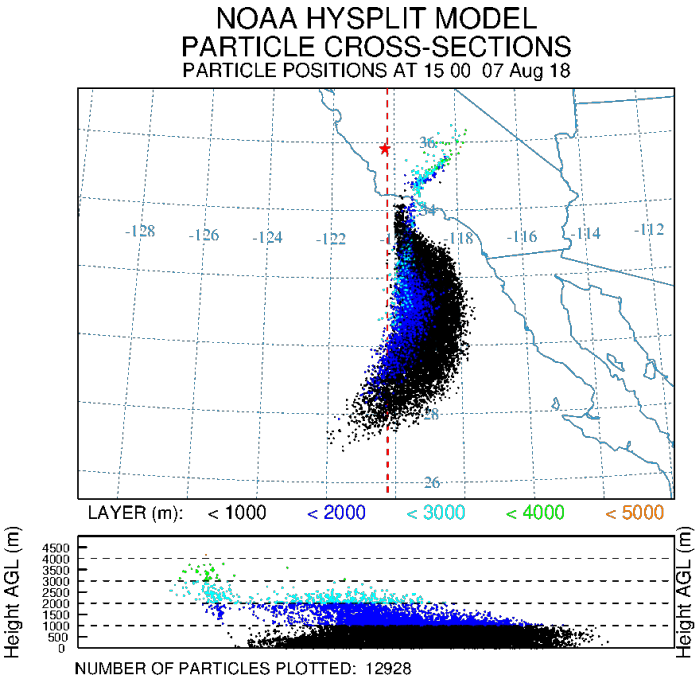


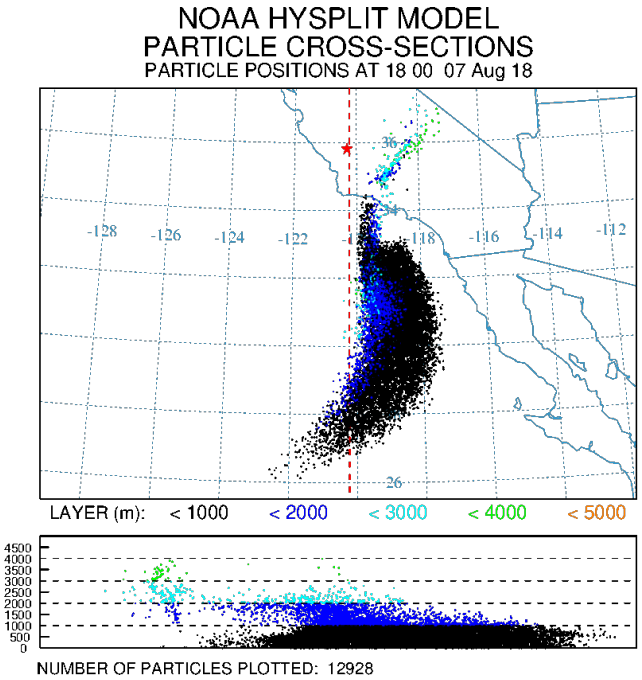





NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 09 00 07 Aug 18
LAYER (m): < 1000 < 2000 < 3000 < 4000 < 5000
Height AGL (m)
NUMBER OF PARTICLES PLOTTED: 12928

NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 12 00 07 Aug 18
LAYER (m): < 1000 < 2000 < 3000 < 4000 < 5000
Height AGL (m)
NUMBER OF PARTICLES PLOTTED: 12928


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 15 00 07 Aug 18
LAYER (m): < 1000 < 2000 < 3000 < 4000 < 5000
Height AGL (m)
NUMBER OF PARTICLES PLOTTED: 12928


NOAA HYSPLIT MODEL
PARTICLE CROSS-SECTIONS
PARTICLE POSITIONS AT 18 00 07 Aug 18
LAYER (m): < 1000 < 2000 < 3000 < 4000 < 5000
Height AGL (m)
NUMBER OF PARTICLES PLOTTED: 12928

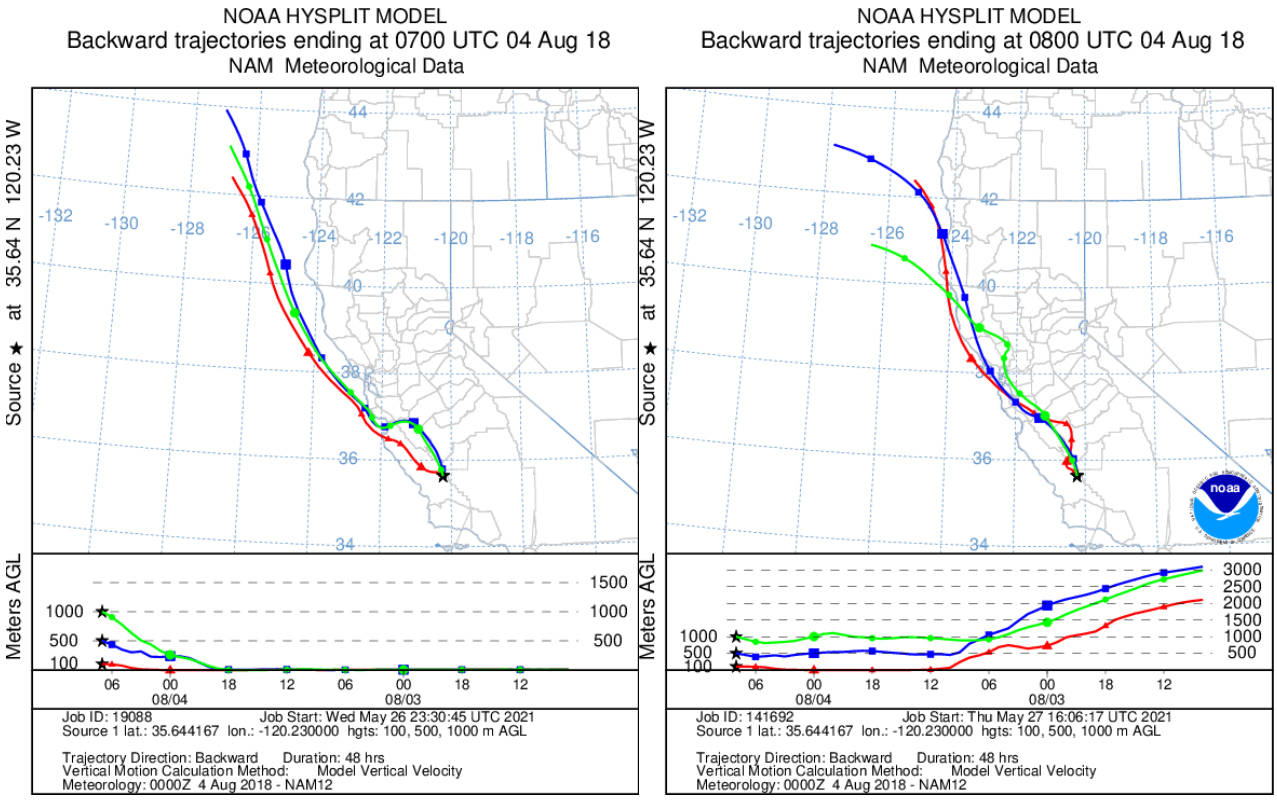
B. HYSPLIT Backward Trajectory[54]

NOAA's HYSPLIT[55] model was used to determine simple back-trajectories showing the path that an air parcel took for a specified period of time (here, 48 hours), starting at the Red Hills monitor at times of peak concentrations on each day. Three height levels (red: 100 meters (m); blue: 500m; green: 1000m) were used to indicate transport near the surface and in the upper atmosphere.

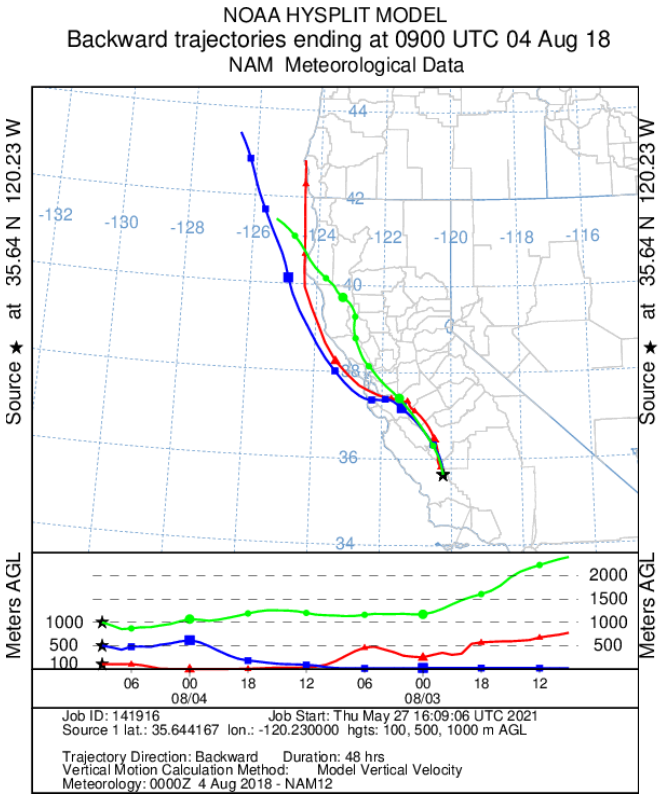
Each section includes each hour of the violating 8-hour period and show consistent influence from wildfires in the northern portion of the state that dispersed smoke and precursor emissions into the atmosphere.

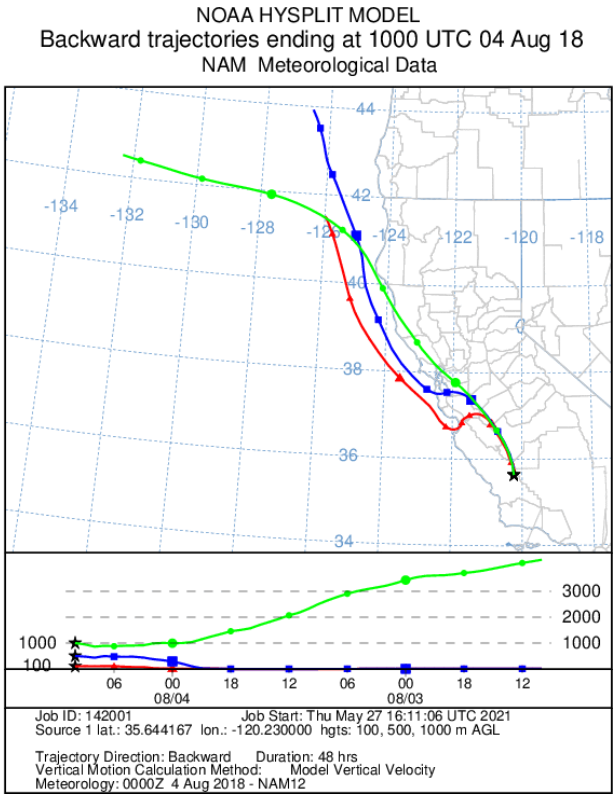
1. August 3, 2018 23PST to August 4, 2018 06PST

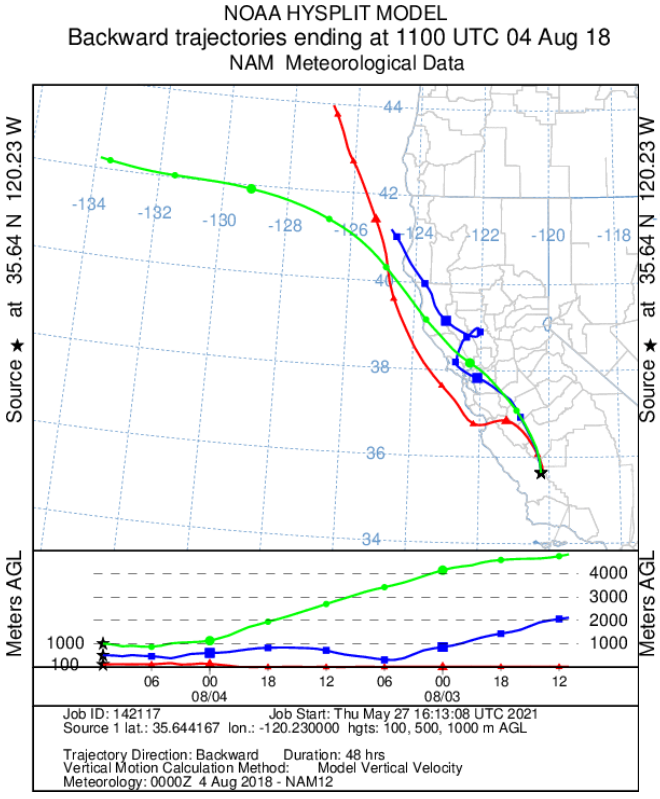
(August 4, 2018 07UTC to 14UTC)

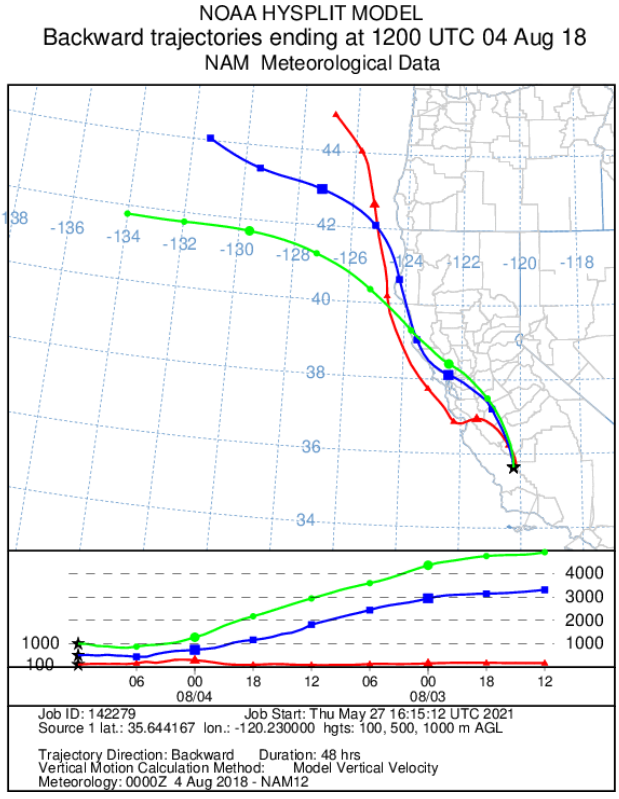


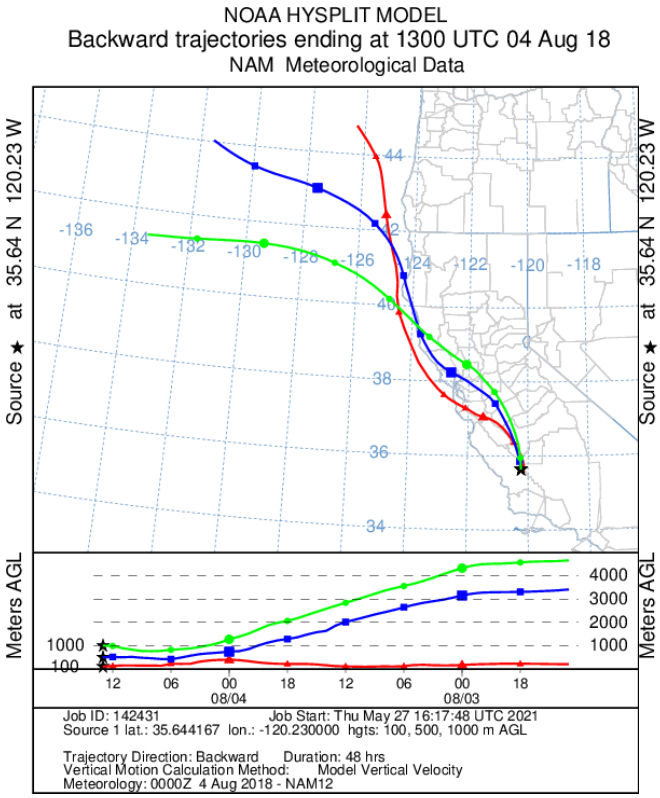
[54] CARB acknowledges the NOAA Air Resources Laboratory, Real-time Environmental Applications and Display System (READY), for the provision of the *HYSPLIT-WEB transport and dispersion model* used in this document.
[55] HYbrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT)

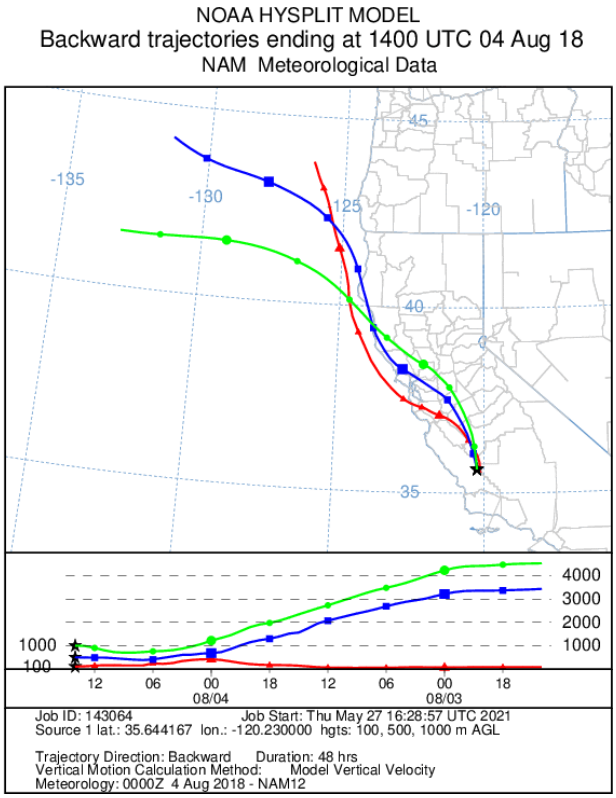

NOAA HYSPLIT MODEL
Backward trajectories ending at 0900 UTC 04 Aug 18
NAM Meteorological Data
Source ★ at 35.64 N 120.23 W
Meters AGL
Job ID: 141916 Job Start: Thu May 27 16:09:06 UTC 2021
Source 1 lat.: 35.644167 lon.: -120.230000 hgts: 100, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 4 Aug 2018 - NAM12


NOAA HYSPLIT MODEL
Backward trajectories ending at 1000 UTC 04 Aug 18
NAM Meteorological Data
Source ★ at 35.64 N 120.23 W
Meters AGL
Job ID: 142001 Job Start: Thu May 27 16:11:06 UTC 2021
Source 1 lat.: 35.644167 lon.: -120.230000 hgts: 100, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 4 Aug 2018 - NAM12


NOAA HYSPLIT MODEL
Backward trajectories ending at 1100 UTC 04 Aug 18
NAM Meteorological Data
Source ★ at 35.64 N 120.23 W
Meters AGL
Job ID: 142117 Job Start: Thu May 27 16:13:08 UTC 2021
Source 1 lat.: 35.644167 lon.: -120.230000 hgts: 100, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 4 Aug 2018 - NAM12

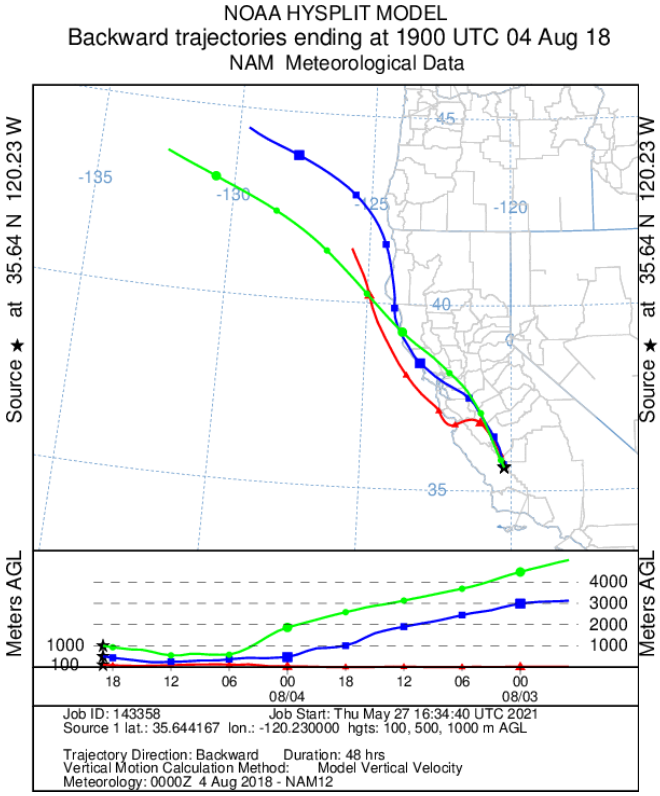

NOAA HYSPLIT MODEL
Backward trajectories ending at 1200 UTC 04 Aug 18
NAM Meteorological Data
Source ★ at 35.64 N 120.23 W
Meters AGL
Job ID: 142279 Job Start: Thu May 27 16:15:12 UTC 2021
Source 1 lat.: 35.644167 lon.: -120.230000 hgts: 100, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 4 Aug 2018 - NAM12

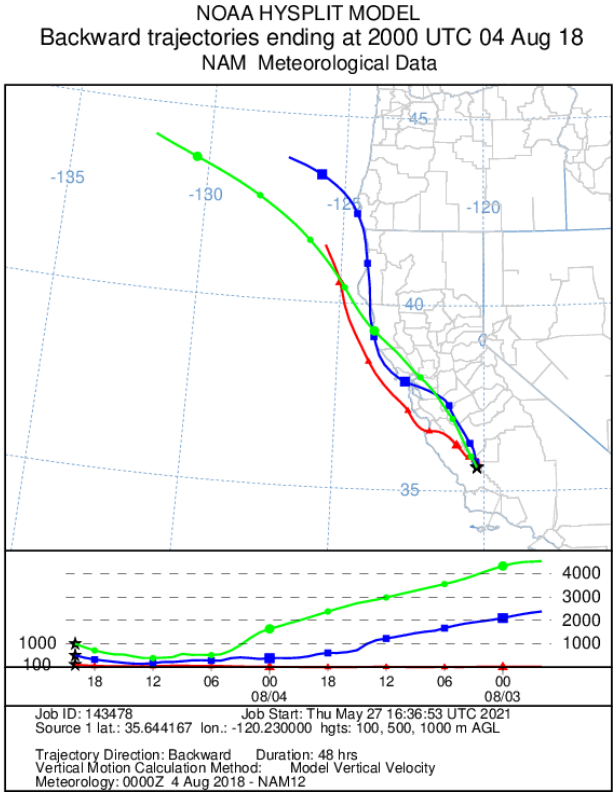




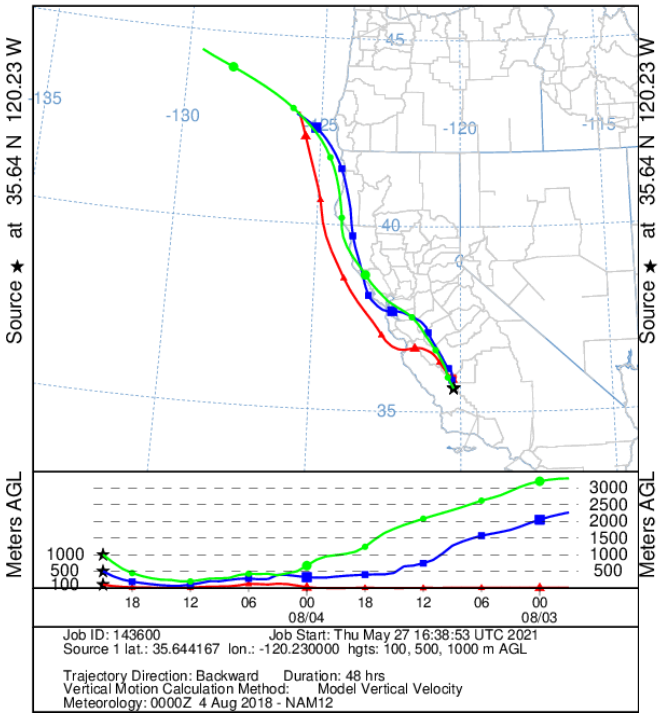
2. August 4, 2018 11PST to 18PST

(August 4, 2018 19UTC to August 5, 2018 02UTC)





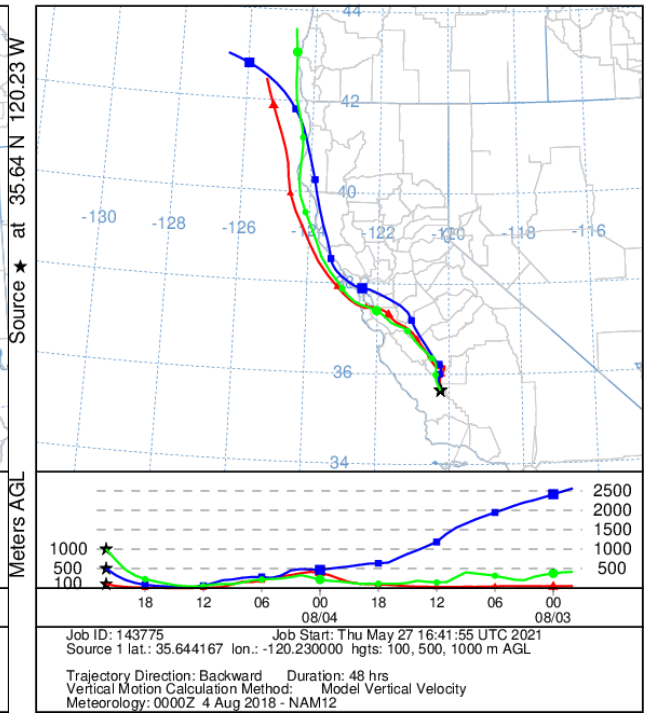
NOAA HYSPLIT MODEL
Backward trajectories ending at 2100 UTC 04 Aug 18
NAM Meteorological Data



Job ID: 143600 Job Start: Thu May 27 16:38:53 UTC 2021
Source 1 lat.: 35.644167 lon.: -120.230000 hgts: 100, 500, 1000 m AGL

Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 4 Aug 2018 - NAM12

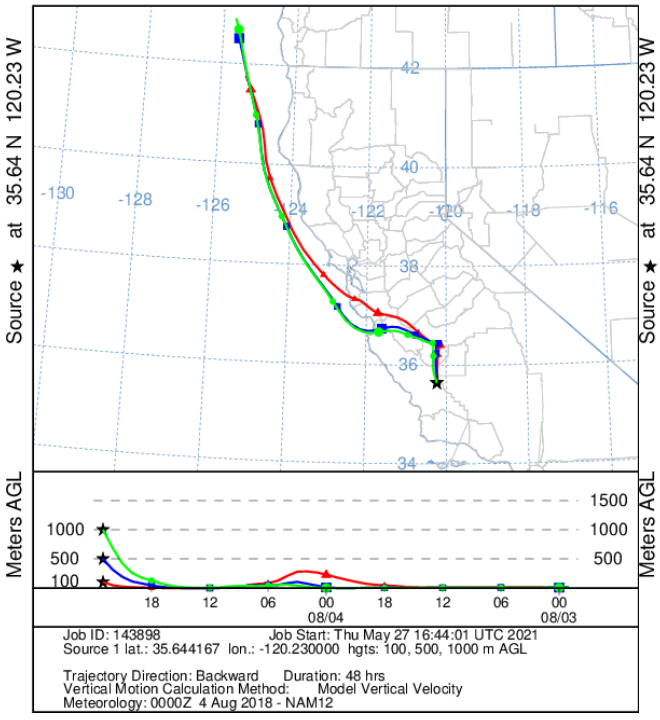
NOAA HYSPLIT MODEL
Backward trajectories ending at 2200 UTC 04 Aug 18
NAM Meteorological Data



Job ID: 143775 Job Start: Thu May 27 16:41:55 UTC 2021
Source 1 lat.: 35.644167 lon.: -120.230000 hgts: 100, 500, 1000 m AGL

Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 4 Aug 2018 - NAM12

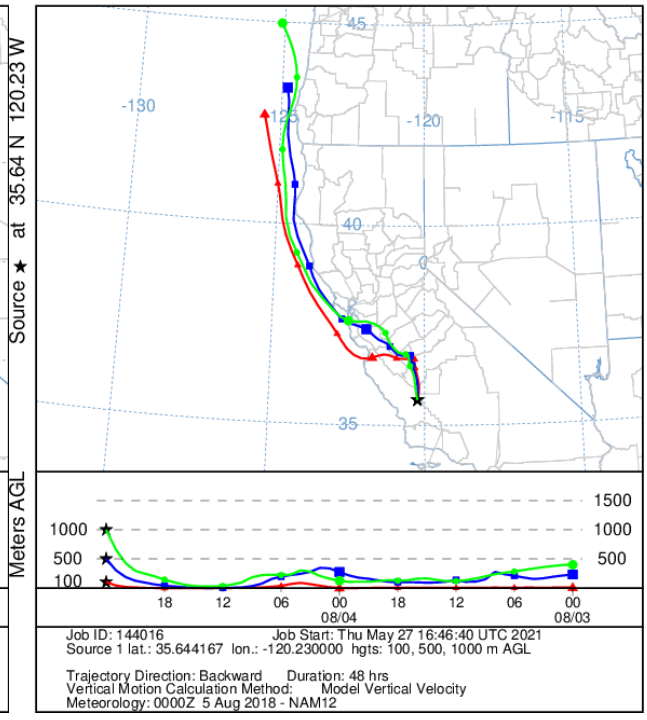
NOAA HYSPLIT MODEL
Backward trajectories ending at 2300 UTC 04 Aug 18
NAM Meteorological Data



Job ID: 143898 Job Start: Thu May 27 16:44:01 UTC 2021
Source 1 lat.: 35.644167 lon.: -120.230000 hgts: 100, 500, 1000 m AGL

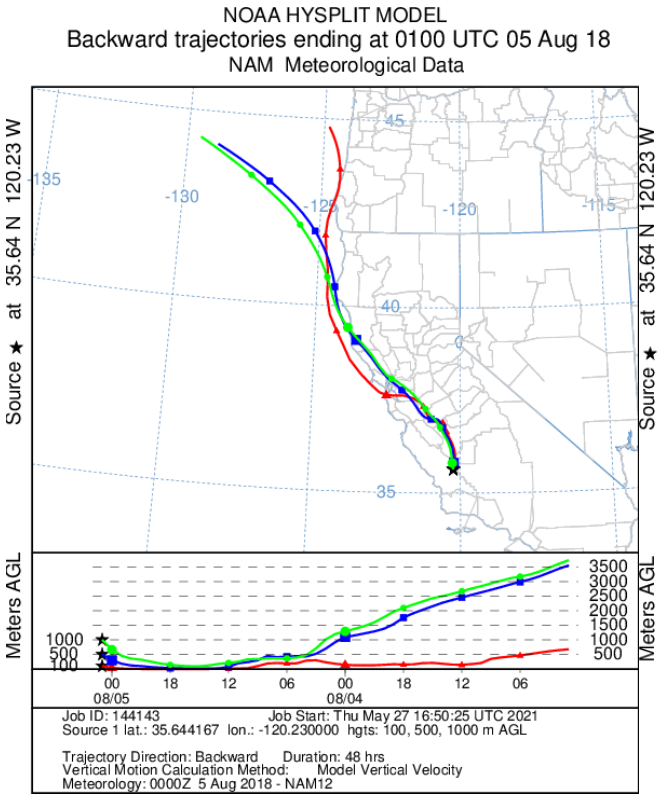
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 4 Aug 2018 - NAM12

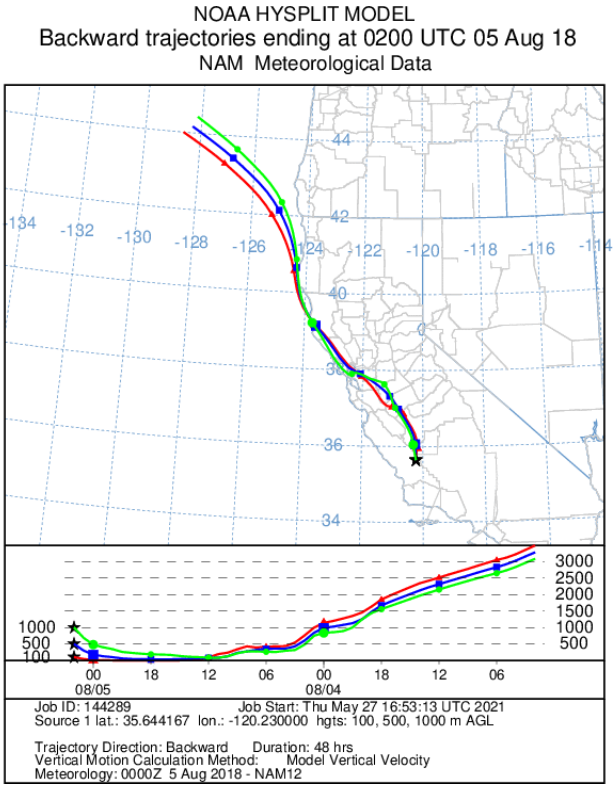
NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 05 Aug 18
NAM Meteorological Data



Job ID: 144016 Job Start: Thu May 27 16:46:40 UTC 2021
Source 1 lat.: 35.644167 lon.: -120.230000 hgts: 100, 500, 1000 m AGL

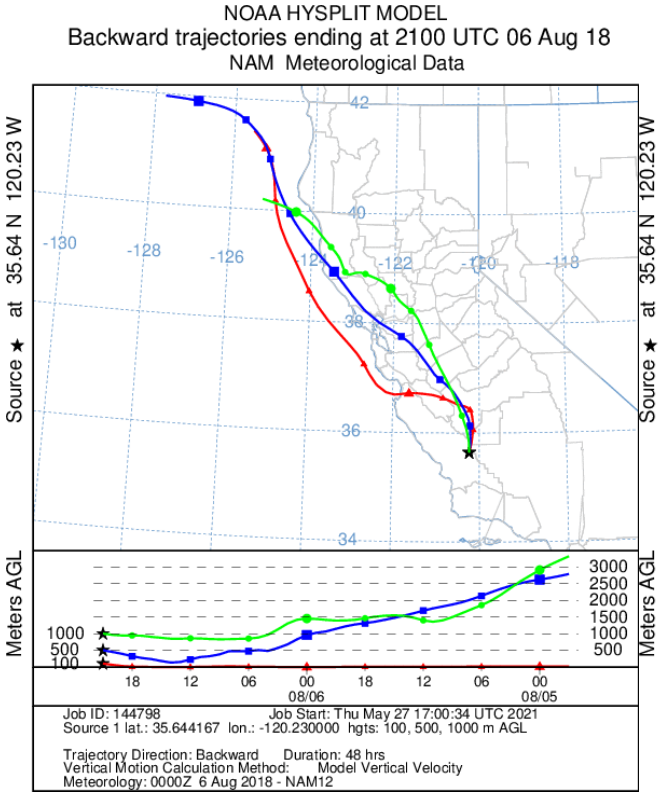
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 5 Aug 2018 - NAM12

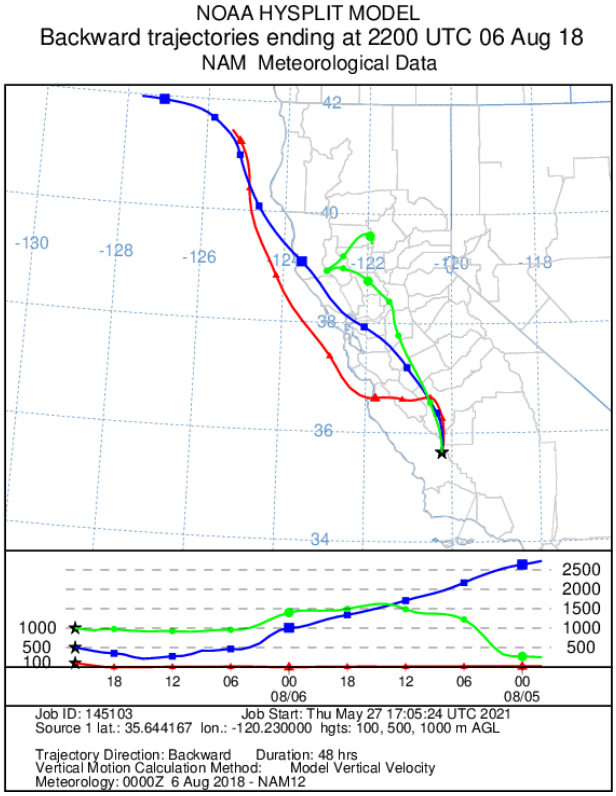


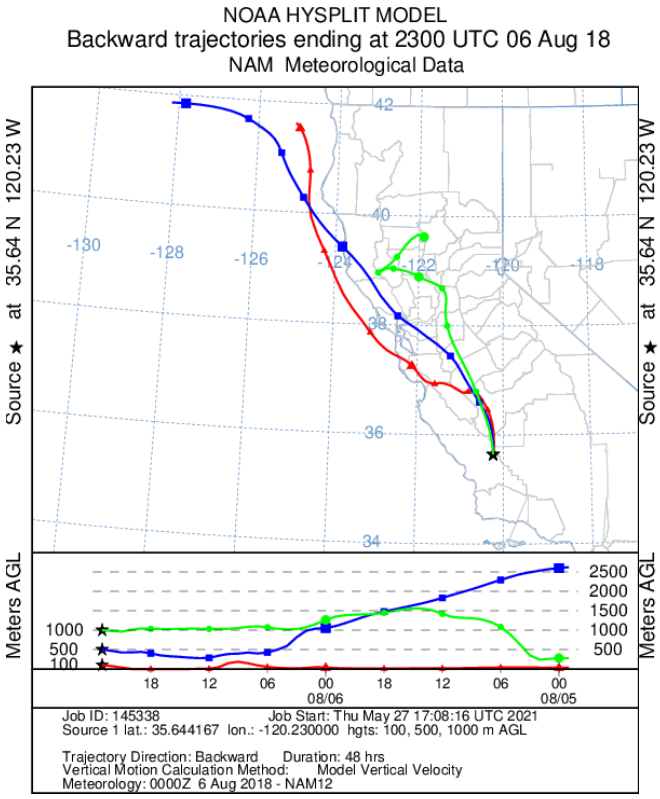


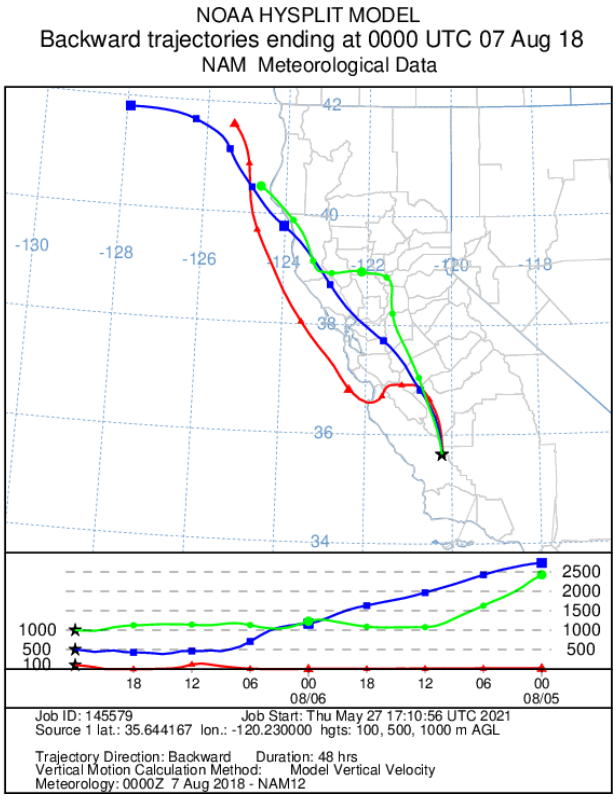
3. August 6, 2018 13PST to 20PST

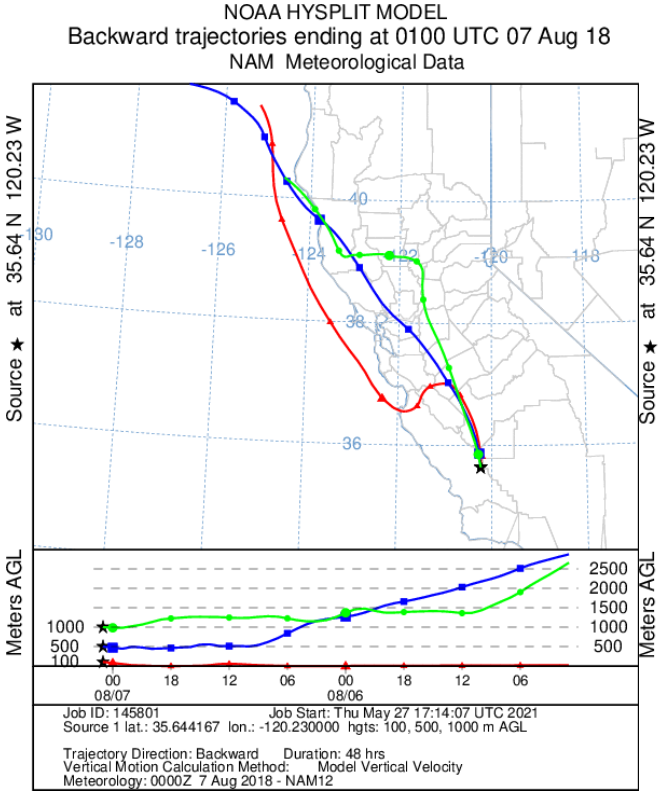
(August 6, 2018 21UTC to August 7, 2018 04UTC)

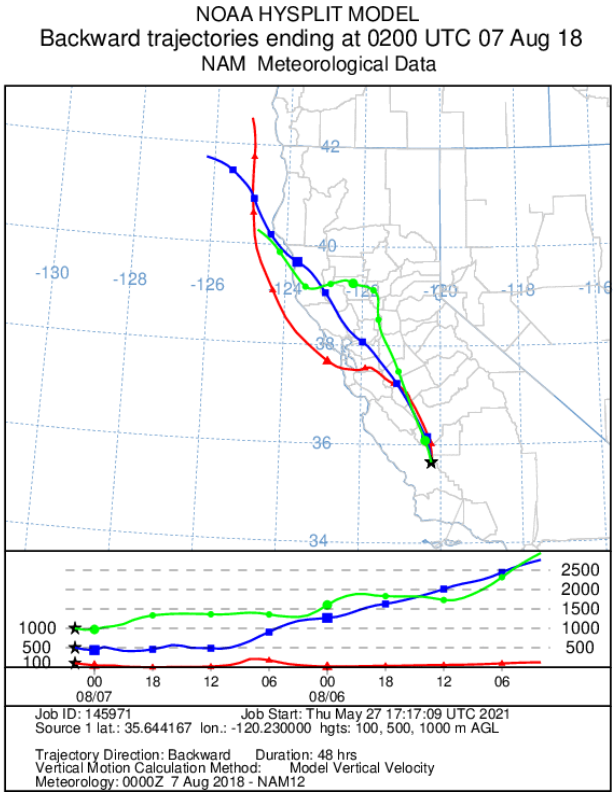


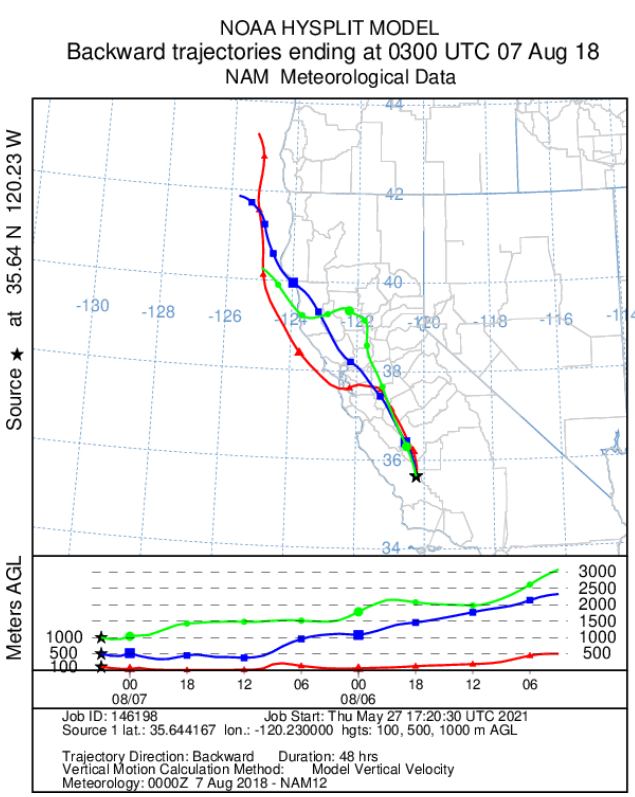


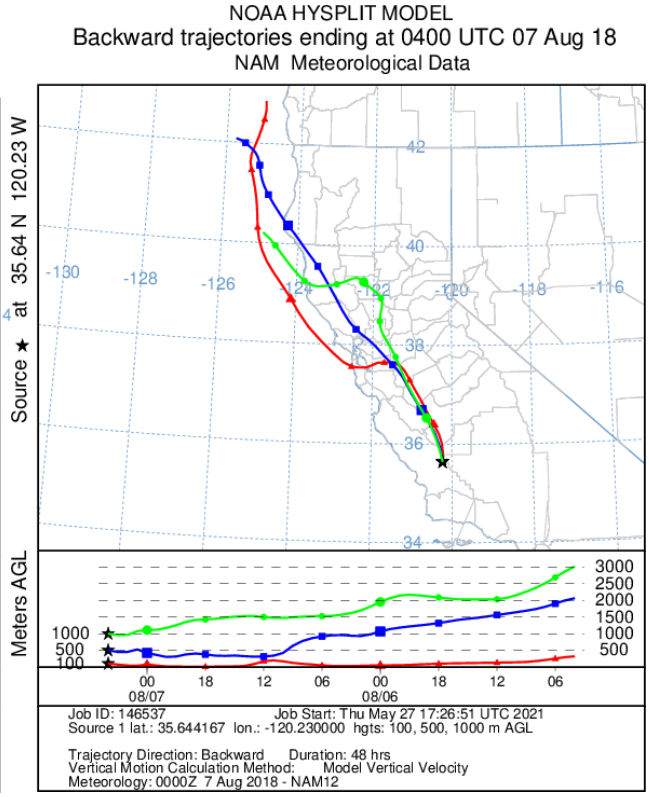

NOAA HYSPLIT MODEL
Backward trajectories ending at 2300 UTC 06 Aug 18
NAM Meteorological Data
Source ★ at 35.64 N 120.23 W
Meters AGL
Job ID: 145338 Job Start: Thu May 27 17:08:16 UTC 2021
Source 1 lat.: 35.644167 lon.: -120.230000 hgts: 100, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 6 Aug 2018 - NAM12


NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 07 Aug 18
NAM Meteorological Data
Source ★ at 35.64 N 120.23 W
Meters AGL
Job ID: 145579 Job Start: Thu May 27 17:10:56 UTC 2021
Source 1 lat.: 35.644167 lon.: -120.230000 hgts: 100, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 7 Aug 2018 - NAM12


NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 07 Aug 18
NAM Meteorological Data
Source ★ at 35.64 N 120.23 W
Meters AGL
Job ID: 145801 Job Start: Thu May 27 17:14:07 UTC 2021
Source 1 lat.: 35.644167 lon.: -120.230000 hgts: 100, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 7 Aug 2018 - NAM12

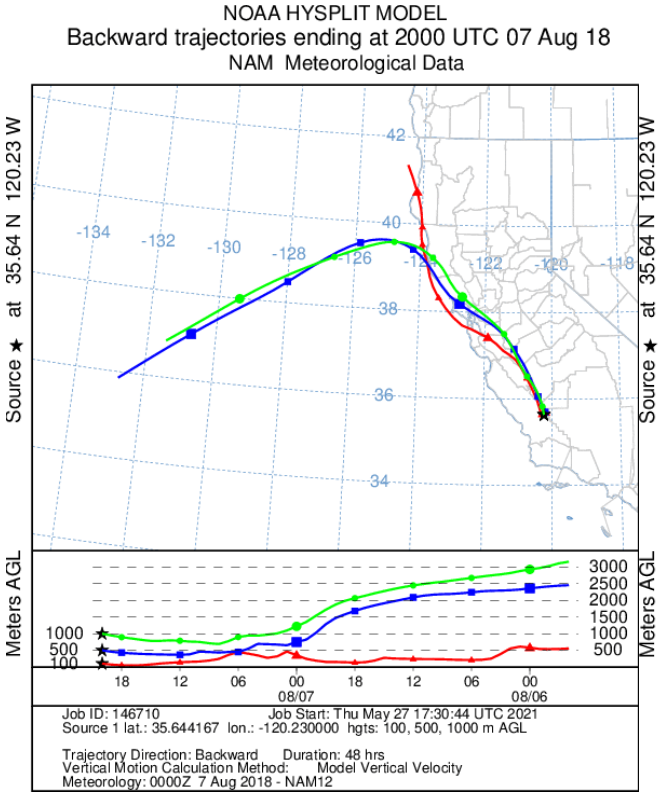

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 07 Aug 18
NAM Meteorological Data
Source ★ at 35.64 N 120.23 W
Meters AGL
Job ID: 145971 Job Start: Thu May 27 17:17:09 UTC 2021
Source 1 lat.: 35.644167 lon.: -120.230000 hgts: 100, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 7 Aug 2018 - NAM12

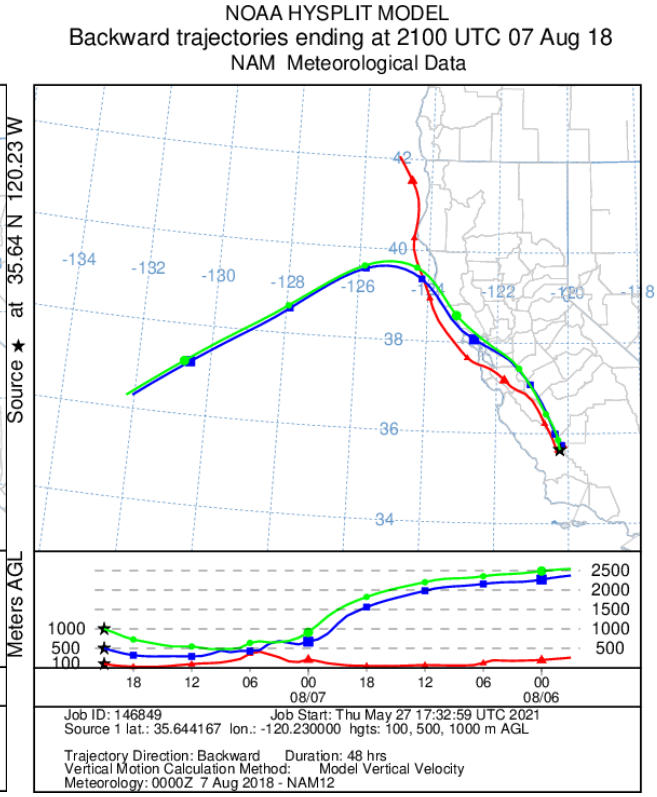


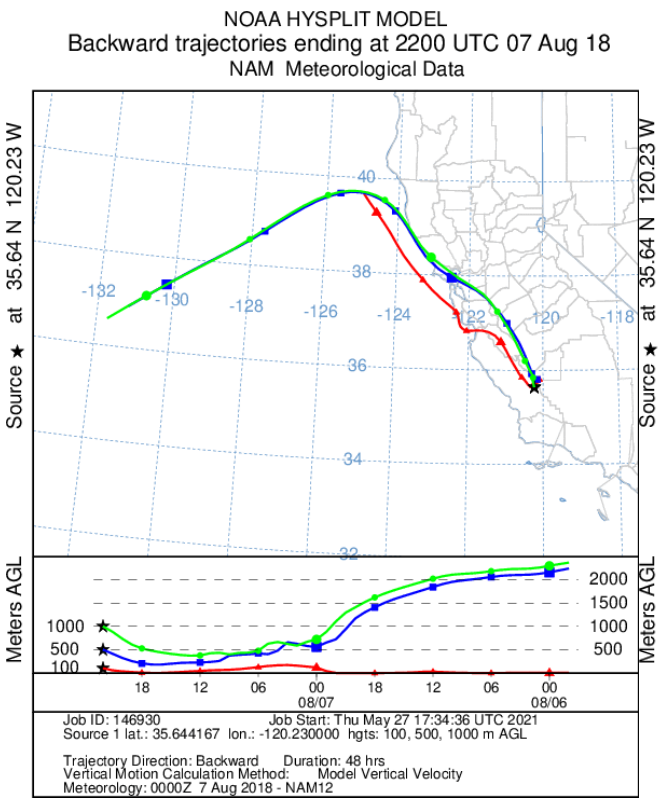


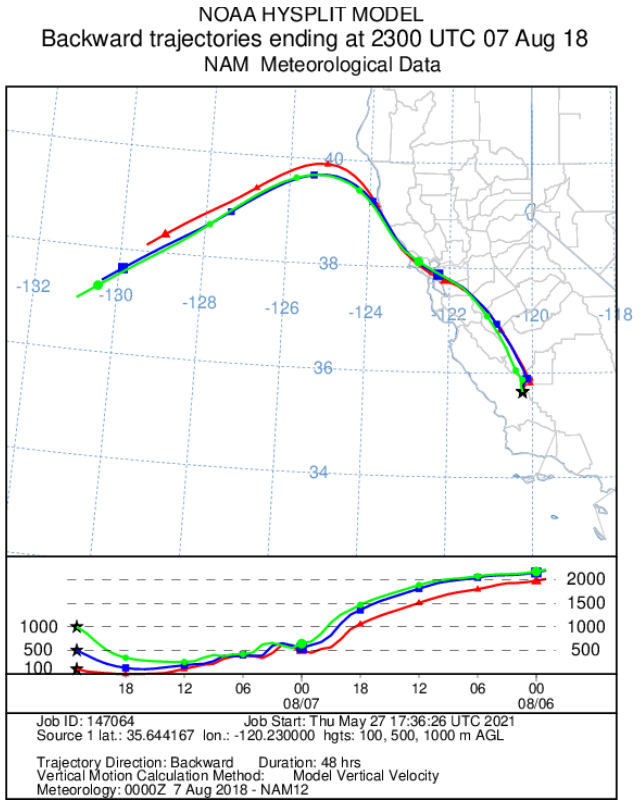
4. August 7, 2018 12PST to 19PST

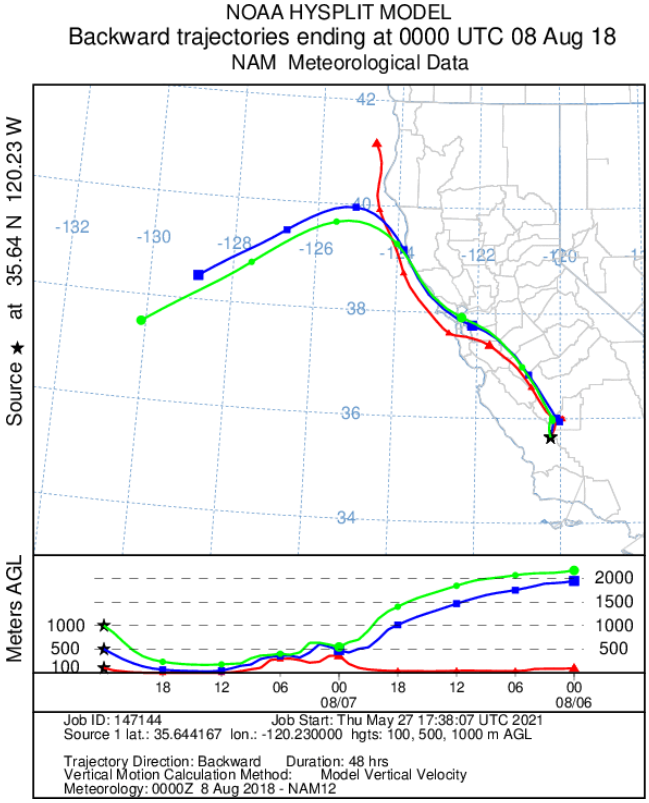
(August 7, 2018 20UTC to August 8, 2018 03UTC)

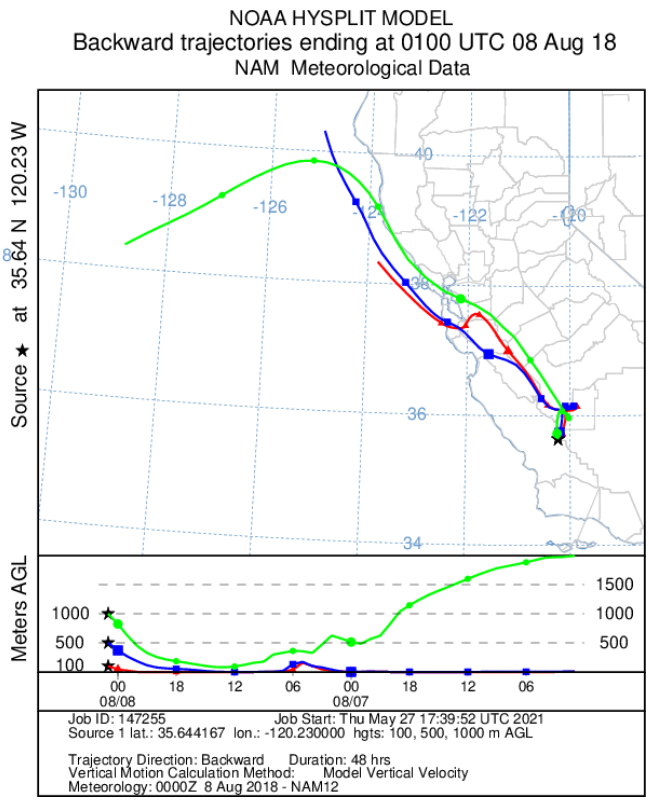


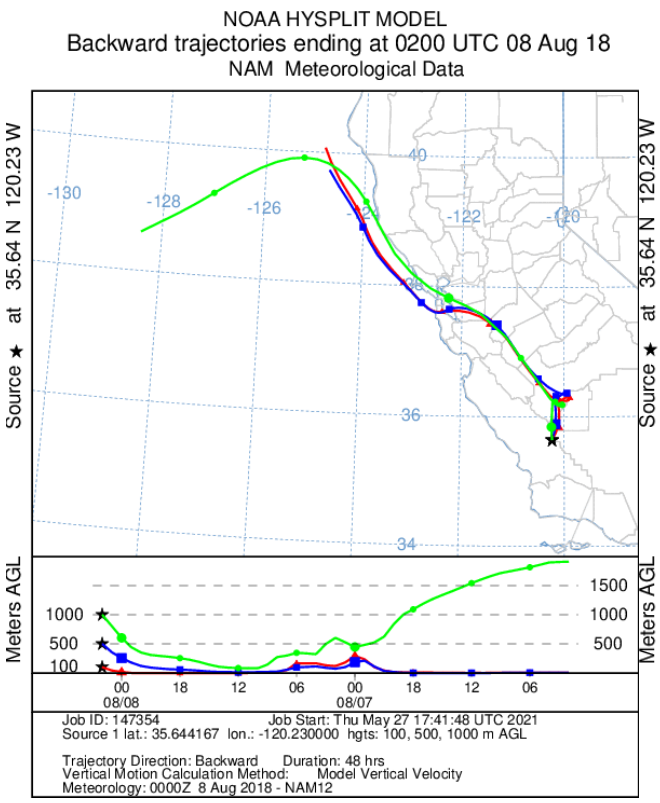


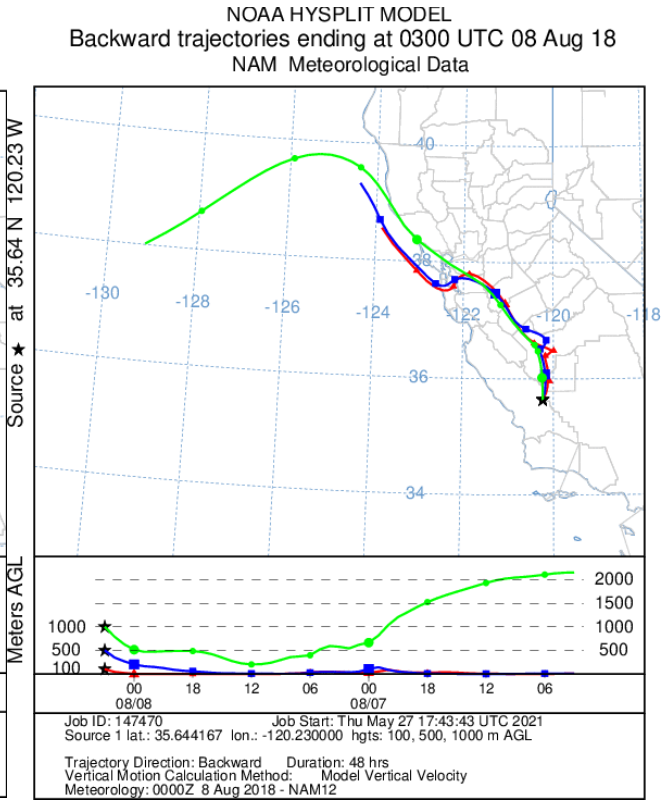

NOAA HYSPLIT MODEL
Backward trajectories ending at 2200 UTC 07 Aug 18
NAM Meteorological Data
Source ★ at 35.64 N 120.23 W
Meters AGL
Job ID: 146930 Job Start: Thu May 27 17:34:36 UTC 2021
Source 1 lat.: 35.644167 lon.: -120.230000 hgts: 100, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 7 Aug 2018 - NAM12


NOAA HYSPLIT MODEL
Backward trajectories ending at 2300 UTC 07 Aug 18
NAM Meteorological Data
Source ★ at 35.64 N 120.23 W
Meters AGL
Job ID: 147064 Job Start: Thu May 27 17:36:26 UTC 2021
Source 1 lat.: 35.644167 lon.: -120.230000 hgts: 100, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 7 Aug 2018 - NAM12


NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 08 Aug 18
NAM Meteorological Data
Source ★ at 35.64 N 120.23 W
Meters AGL
Job ID: 147144 Job Start: Thu May 27 17:38:07 UTC 2021
Source 1 lat.: 35.644167 lon.: -120.230000 hgts: 100, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 8 Aug 2018 - NAM12

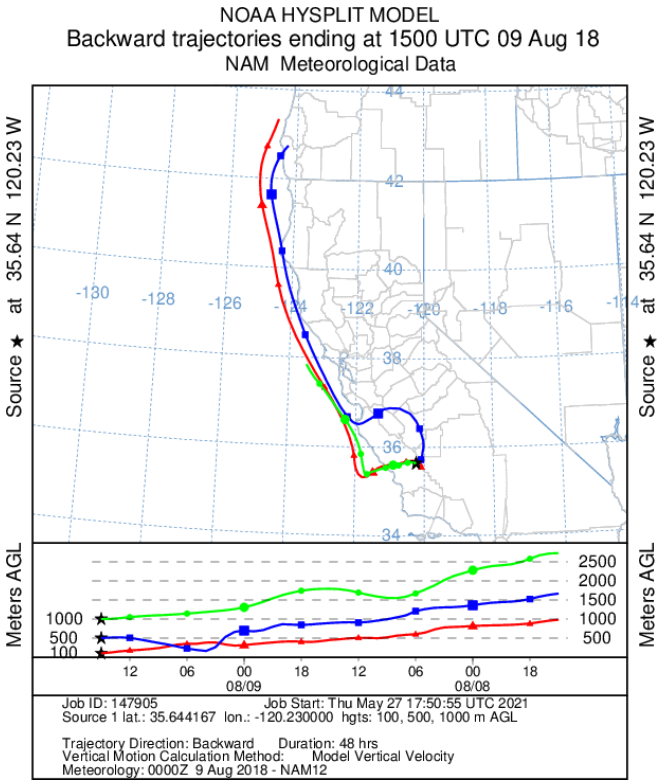

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 08 Aug 18
NAM Meteorological Data
Source ★ at 35.64 N 120.23 W
Meters AGL
Job ID: 147255 Job Start: Thu May 27 17:39:52 UTC 2021
Source 1 lat.: 35.644167 lon.: -120.230000 hgts: 100, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 8 Aug 2018 - NAM12

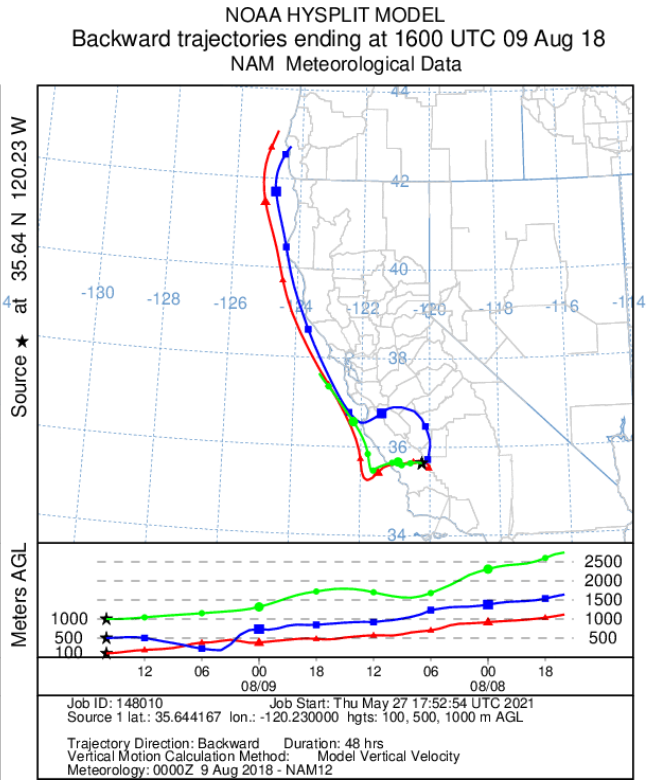




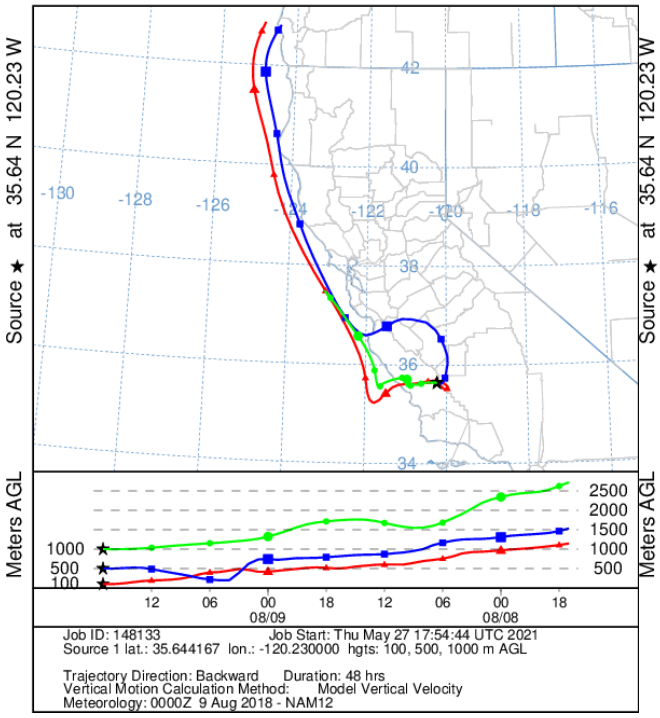
5. August 9, 2018 07PST to 14PST

(August 9, 2018 15UTC to 22UTC)





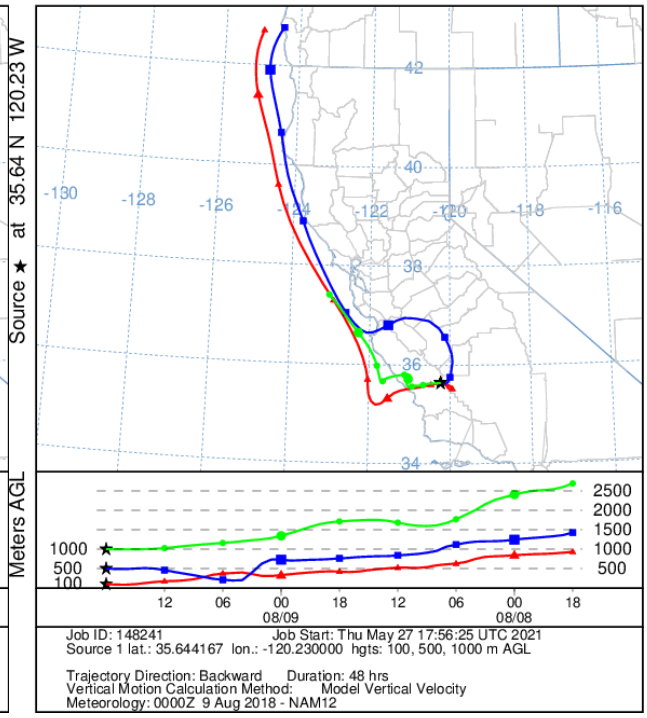
NOAA HYSPLIT MODEL
Backward trajectories ending at 1700 UTC 09 Aug 18
NAM Meteorological Data



Job ID: 148133 Job Start: Thu May 27 17:54:44 UTC 2021
Source 1 lat.: 35.644167 lon.: -120.230000 hgts: 100, 500, 1000 m AGL

Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 9 Aug 2018 - NAM12

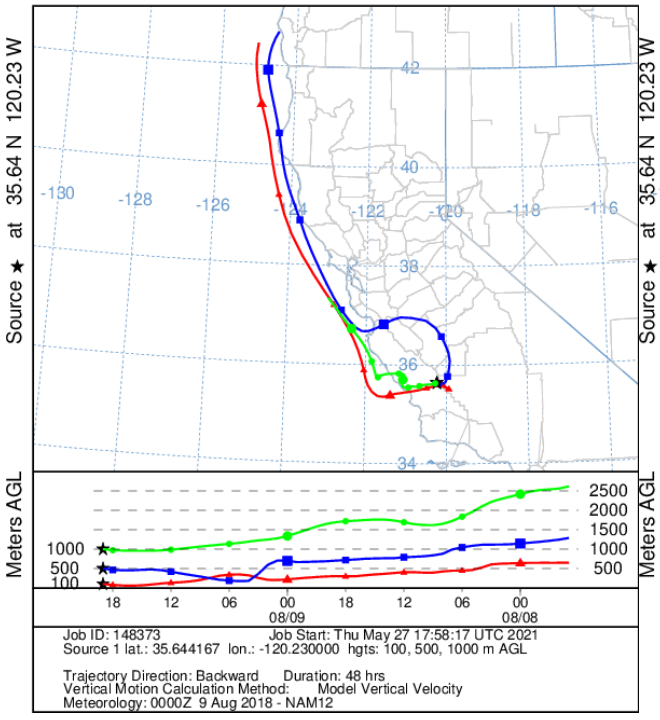
NOAA HYSPLIT MODEL
Backward trajectories ending at 1800 UTC 09 Aug 18
NAM Meteorological Data



Job ID: 148241 Job Start: Thu May 27 17:56:25 UTC 2021
Source 1 lat.: 35.644167 lon.: -120.230000 hgts: 100, 500, 1000 m AGL

Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 9 Aug 2018 - NAM12

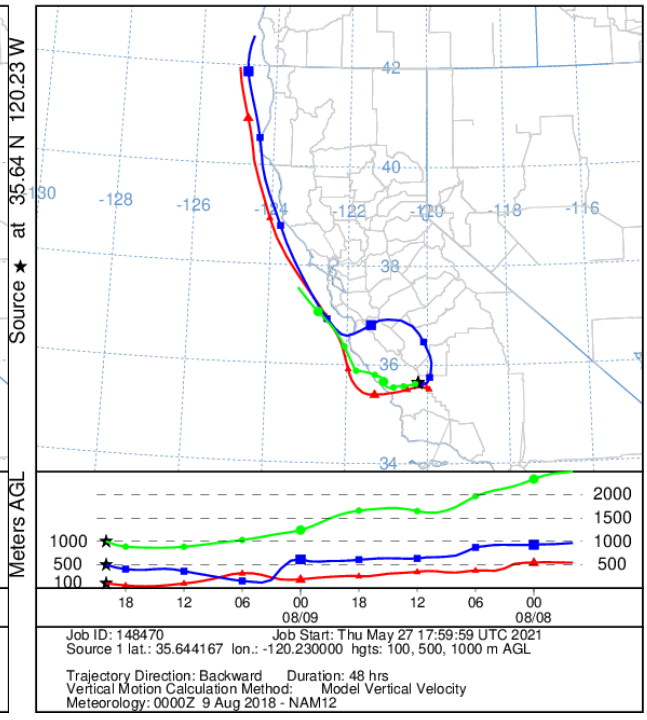
NOAA HYSPLIT MODEL
Backward trajectories ending at 1900 UTC 09 Aug 18
NAM Meteorological Data



Job ID: 148373 Job Start: Thu May 27 17:58:17 UTC 2021
Source 1 lat.: 35.644167 lon.: -120.230000 hgts: 100, 500, 1000 m AGL

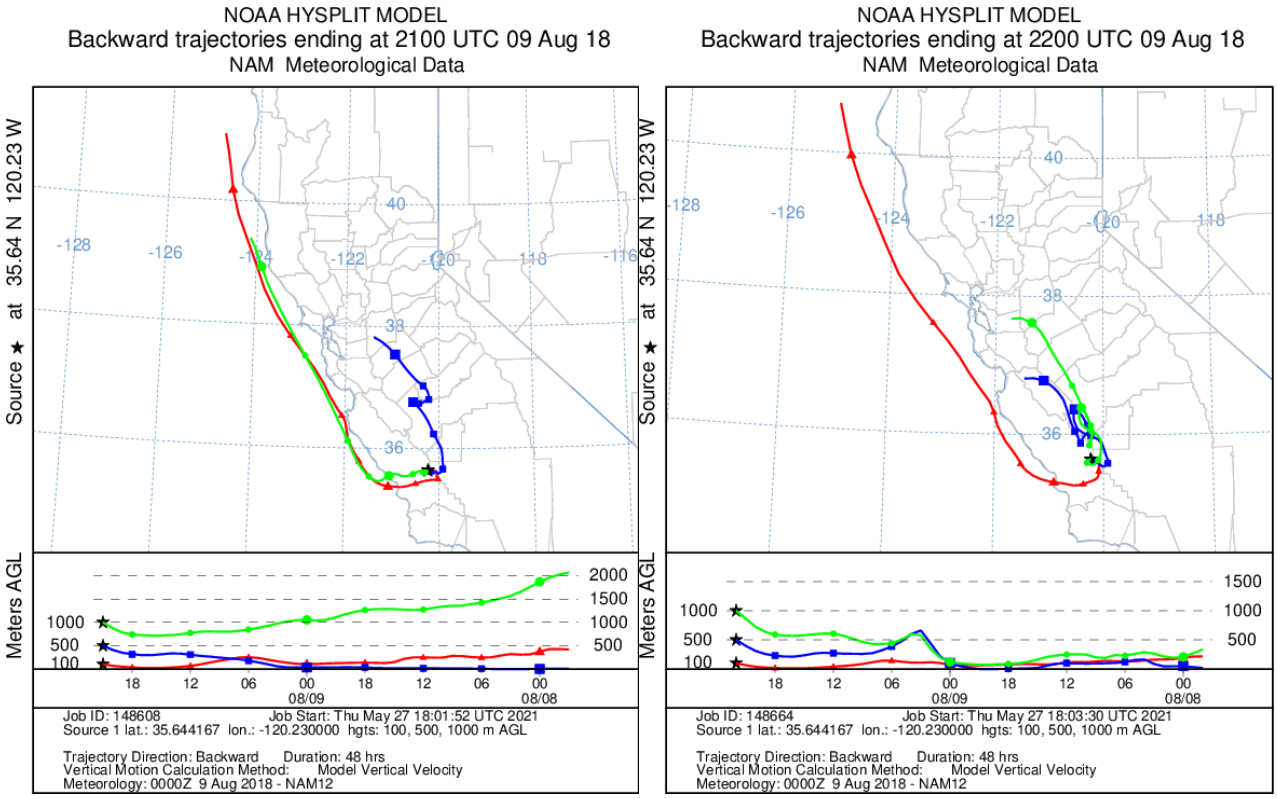
Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 9 Aug 2018 - NAM12

NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 09 Aug 18
NAM Meteorological Data



Job ID: 148470 Job Start: Thu May 27 17:59:59 UTC 2021
Source 1 lat.: 35.644167 lon.: -120.230000 hgts: 100, 500, 1000 m AGL

Trajectory Direction: Backward Duration: 48 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 9 Aug 2018 - NAM12



V. Satellite and Modeled Products

A. NAAPS – AOD and SSC[56]

NAAPS Global Aerosol Model – NAAPS Archive Product

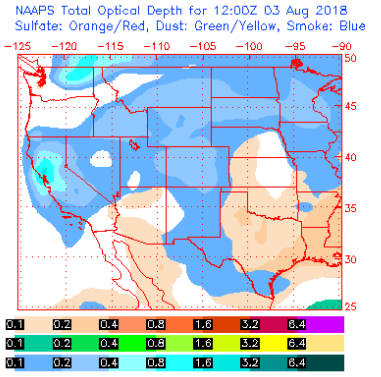
Modeling results are presented for each day at both 5am (05PST) and 5pm (17PST) from August 3 to August 9, 2018.

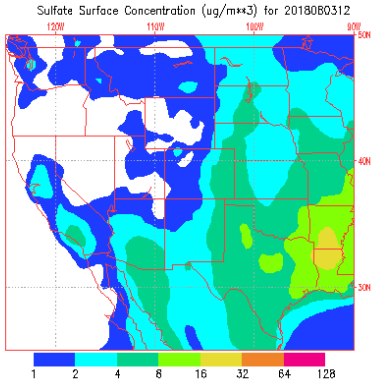
Aerosol optical depth is an indication of the amount of particles in the atmosphere using their scattering and absorbing properties. An AOD of less than 0.1 is considered clean, with higher AOD numbers indicating increasingly poor visibility. The NAAPS model separates the potential sources into dust, sulfates, and smoke, depending on particle size.

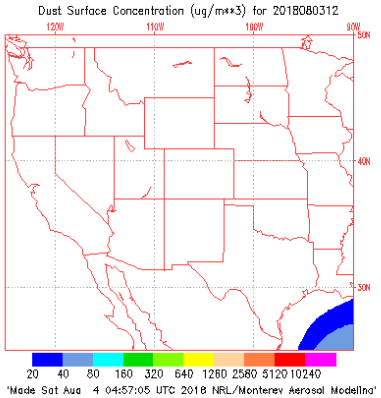
The Total Optical Depth (top left panel) for each day shows smoke over California and the Red Hills region. The Smoke Surface Concentrations (bottom right panel) show the varied surface smoke levels on each day and indicate smoke at the surface level of the Red Hills monitor area.

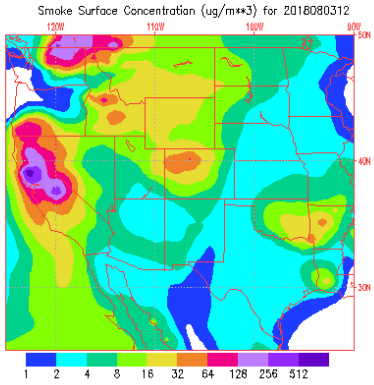
[56] Naval Postgraduate Education, *NAAPS Global Aerosol Model*, last accessed 7/29/21

August 3, 2018 @ 5am PST

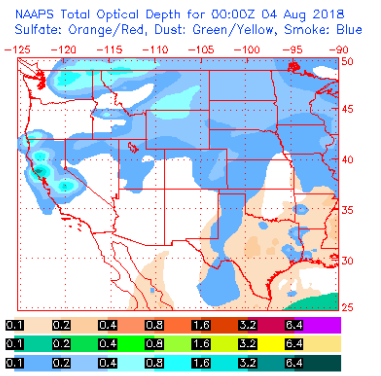


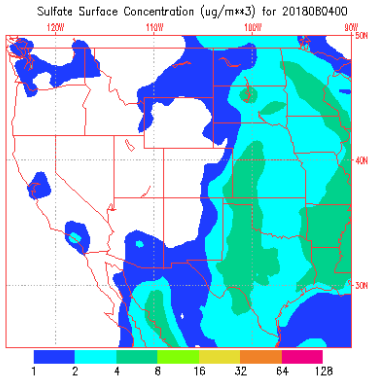


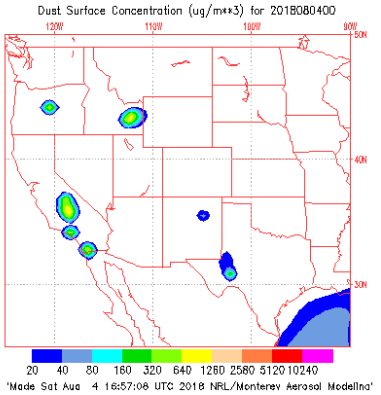


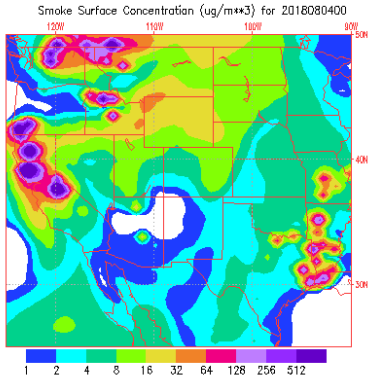


August 3, 2018 @ 5pm PST

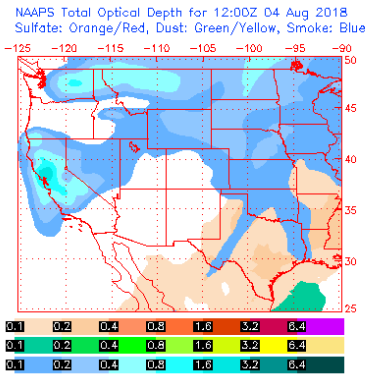


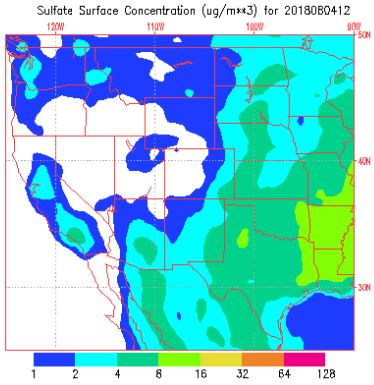


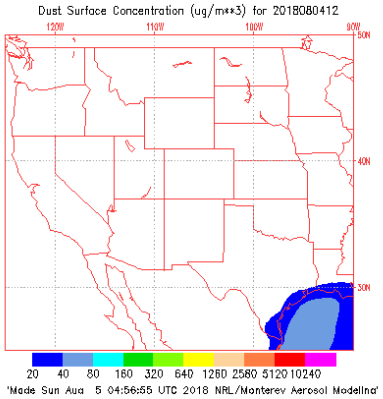


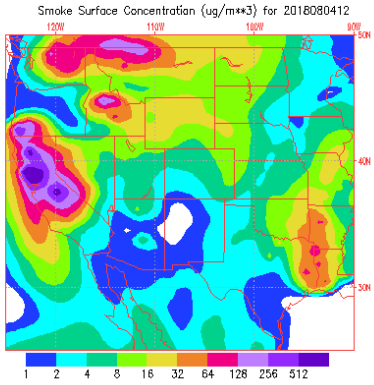


August 4, 2018 @ 5am PST

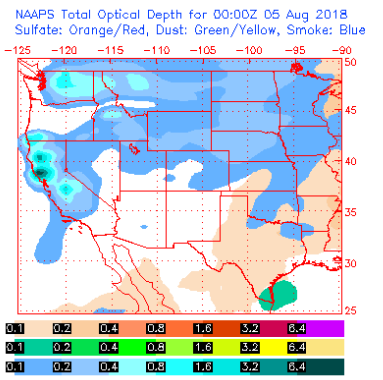


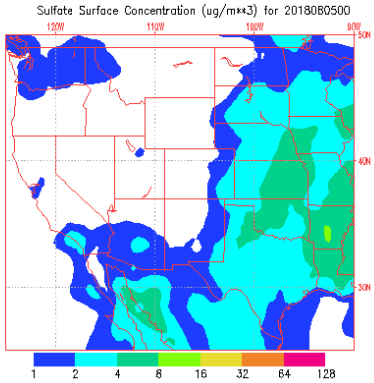


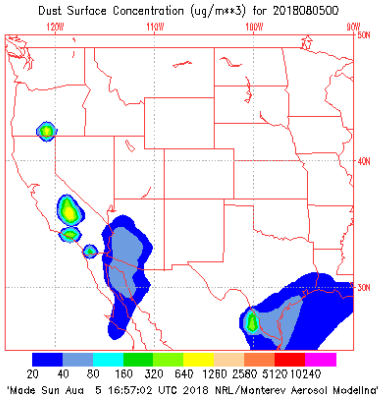


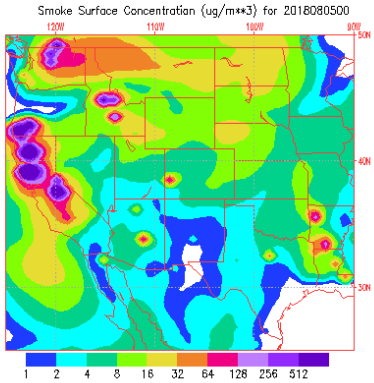


August 4, 2018 @ 5pm PST

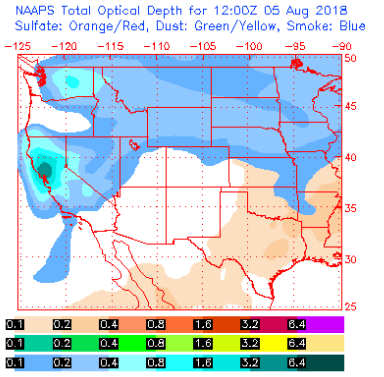


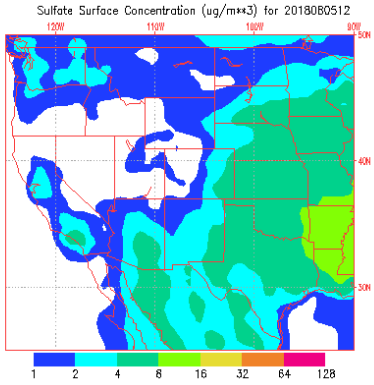


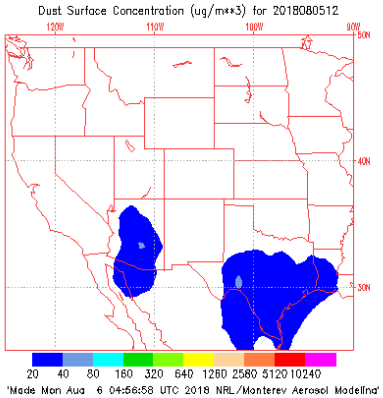


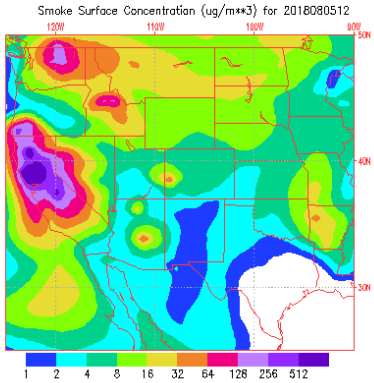


August 5, 2018 @ 5am PST

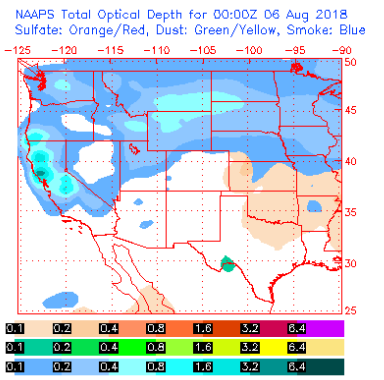


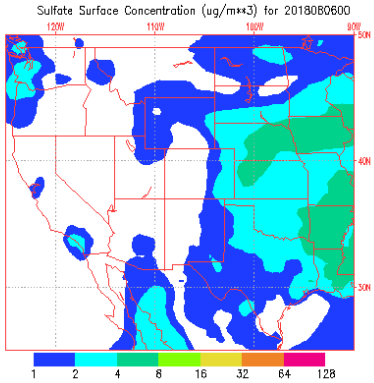


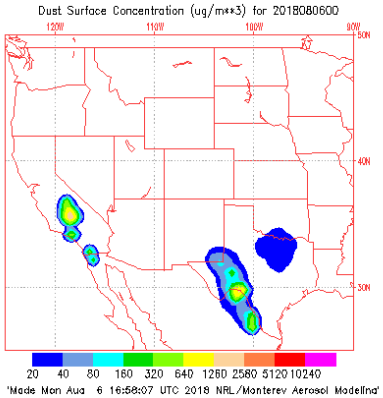


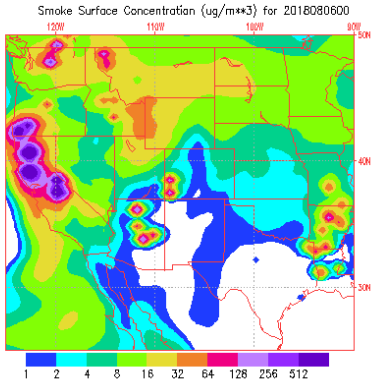


August 5, 2018 @ 5pm PST

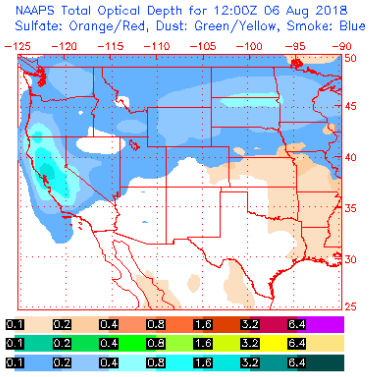


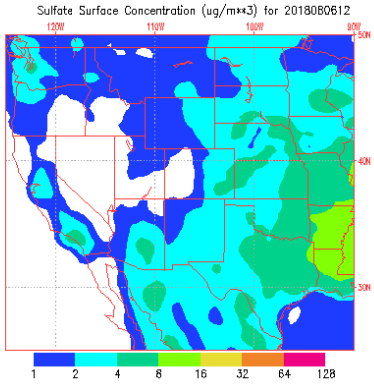


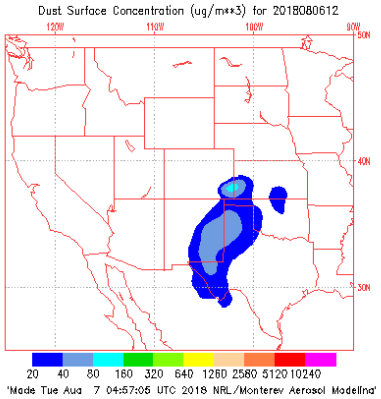


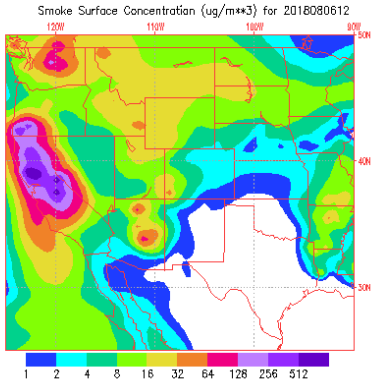


August 6, 2018 @ 5am PST









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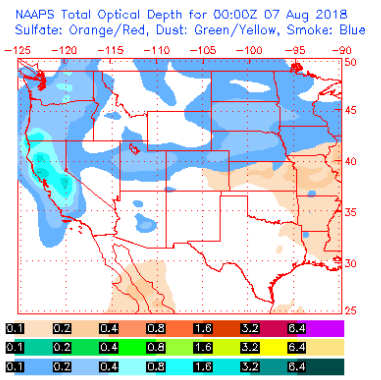
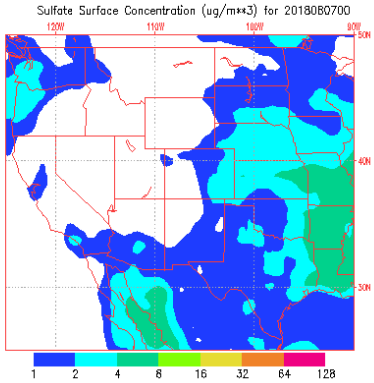
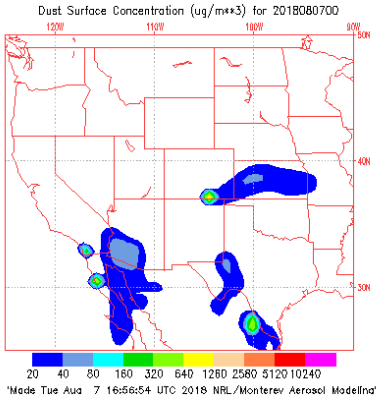
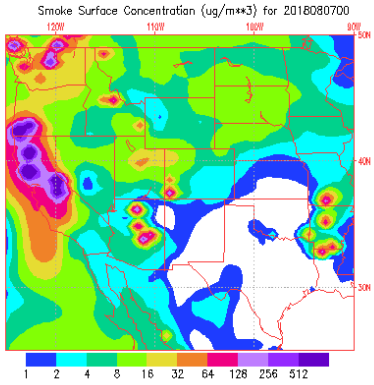
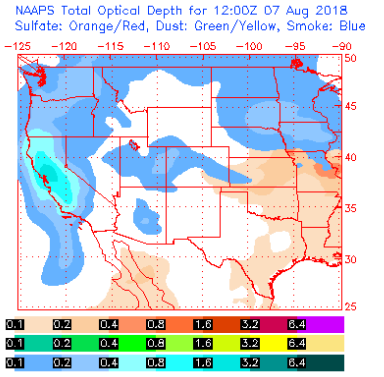


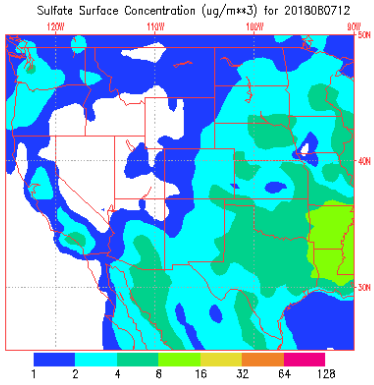


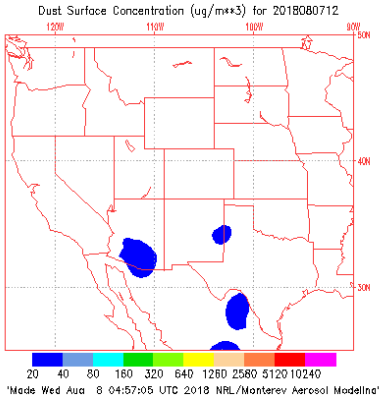


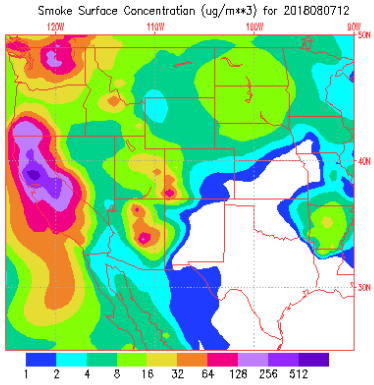


August 7, 2018 @ 5am PST









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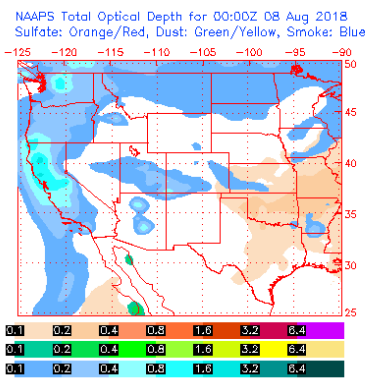
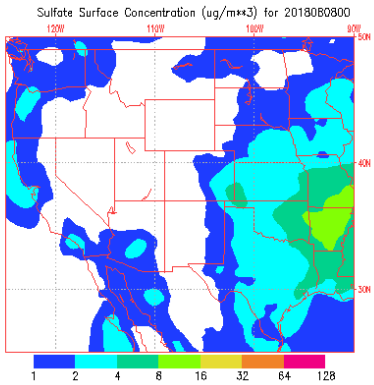
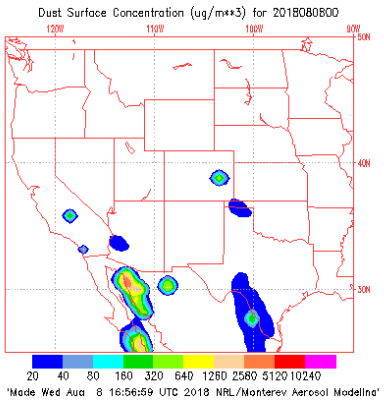
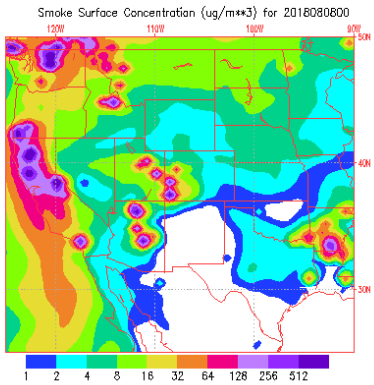
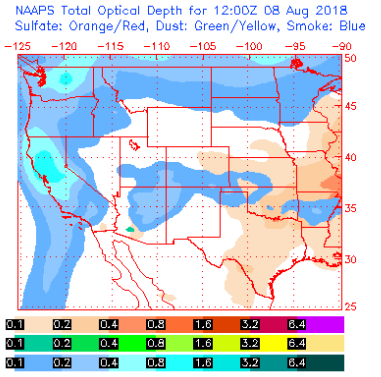


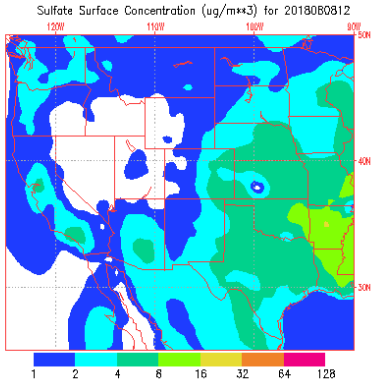


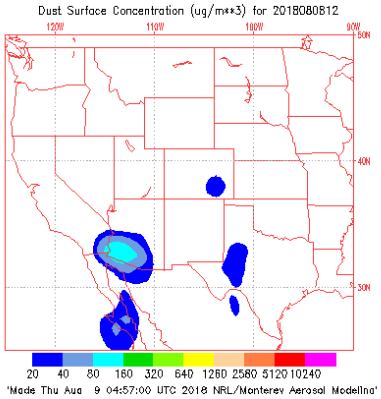


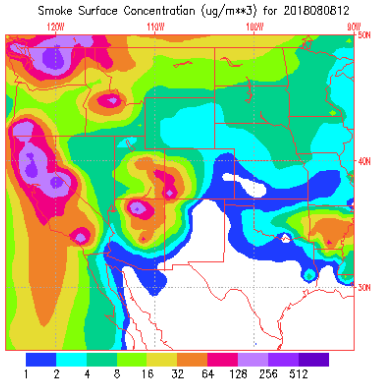


August 8, 2018 @ 5am PST









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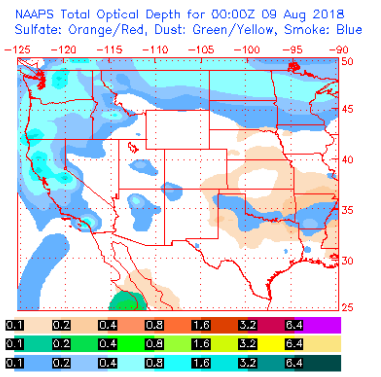
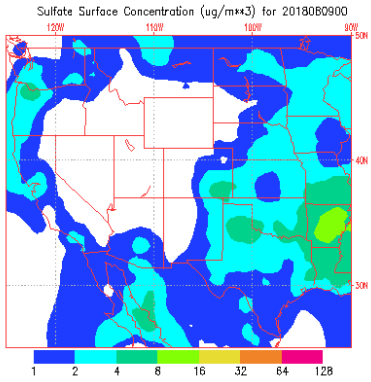
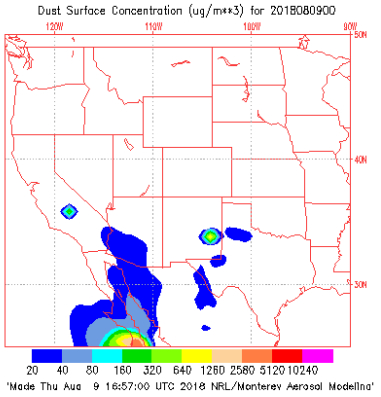
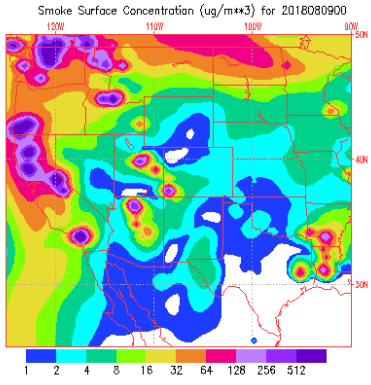
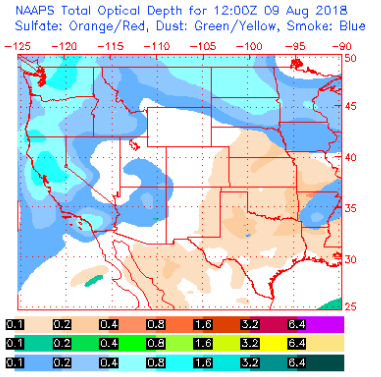


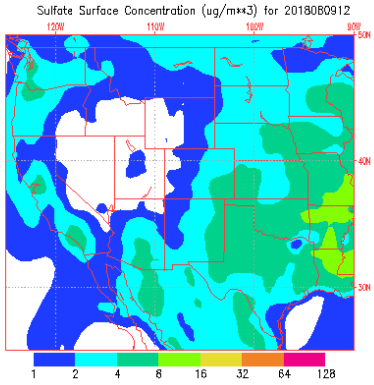


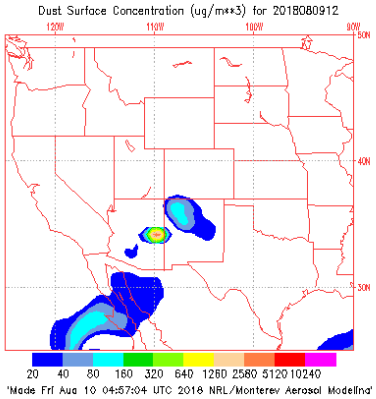


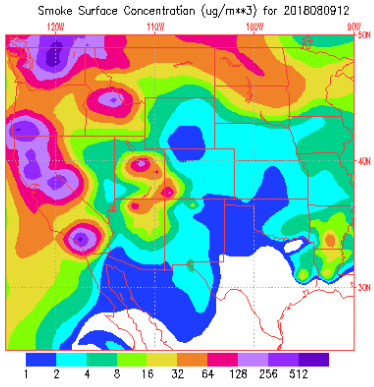


August 9, 2018 @ 5am PST

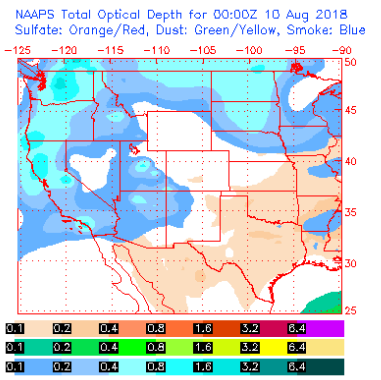


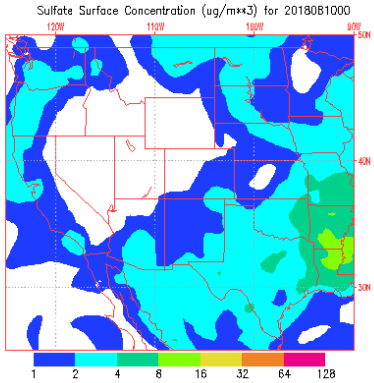


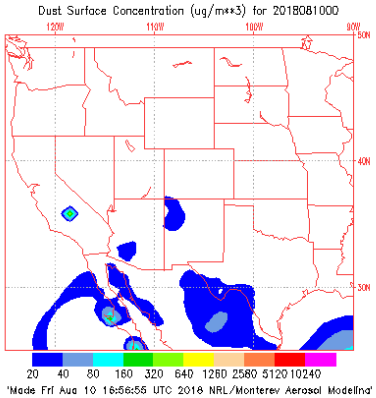


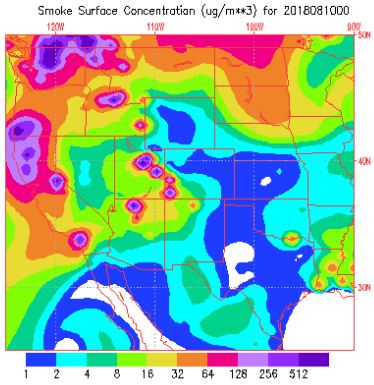


August 9, 2018 @ 5pm PST









B. NOAA Smoke Text Products[57]

Friday, August 3, 2018

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 0547z August 4, 2018.

NESDIS IS INVESTIGATING THE UTILITY OF THIS TEXT NARRATIVE. IF YOU FIND THIS PRODUCT VALUABLE, PLEASE SEND AN EMAIL RESPONSE TO THE FOLLOWING ADDRESS INDICATING HOW YOU AND/OR YOUR AGENCY USE THE INFORMATION. THANK YOU. SEND EMAIL RESPONSES TO: SSDFireTeam@noaa.gov.

SMOKE:
Canada/Western and Central United States....
Wildfires continue over much of the Western United States and Western Canada. A tremendous area of light to moderate density smoke from this activity extended as far east as western Quebec in Canada extending southwest to the Upper Midwest and western Gulf Coast of the United States. Within this area of smoke, a large area of moderate density smoke extended from western Ontario and the upper Midwest of the United States through most of the southern Canadian Provinces, Northern Plains, Northern and Central Rockies towards Washington, Oregon and Central California. Very dense smoke was located closer to the ongoing wildfires over California. Further north, an area of moderate to high density smoke, from fires over northern British Columbia and the Yukon, was extending from the Northwest Territories west through northern British Columbia west to the southern Yukon.

DUST:
The leading edge of Saharan Dust was working into the eastern Caribbean Sea and approaching Puerto Rico.

Hanna

Sunday, August 5, 2018

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 1900Z August 5, 2018.

NESDIS IS INVESTIGATING THE UTILITY OF THIS TEXT NARRATIVE. IF YOU FIND THIS PRODUCT VALUABLE, PLEASE SEND AN EMAIL RESPONSE TO THE FOLLOWING ADDRESS INDICATING HOW YOU AND/OR YOUR AGENCY USE THE INFORMATION. THANK YOU. SEND EMAIL RESPONSES TO: SSDFireTeam@noaa.gov.

SMOKE:
Canada...
Scattered fires in central and northwest British Columbia contribute light-to-moderate density smoke to that region. Individual smoke plumes are seen moving towards the east. A large area of high level smoke from previous-day fires extend eastward across central-northern Alberta and into central Saskatchewan.

Western United States....
Large wildfires continue to burn in northern California and southwest Oregon releasing heavy density smoke plumes near the source that are seen accumulating throughout Sacramento and northern San Joaquin valleys as the smoke travels towards the north-northeast. Higher level smoke is also seen covering much of northern California, southeast Oregon, northern Nevada, southeast Idaho and southwest Montana.

DUST:
Caribbean Sea....
Saharan dust is seen progressing eastward covering much of the Caribbean Sea and advancing towards the Yucatan peninsula this afternoon.

WS

[57] NOAA Hazard and Mapping System (HMS), *Fire and Smoke Text Product*, last accessed 7/29/21

Monday, August 6, 2018

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 1600Z August 6, 2018.

NESDIS IS INVESTIGATING THE UTILITY OF THIS TEXT NARRATIVE. IF YOU FIND THIS PRODUCT VALUABLE, PLEASE SEND AN EMAIL RESPONSE TO THE FOLLOWING ADDRESS INDICATING HOW YOU AND/OR YOUR AGENCY USE THE INFORMATION. THANK YOU. SEND EMAIL RESPONSES TO: SSDFireTeam@noaa.gov.

SMOKE:
Western and central CONUS and western Canada....
Large wildfires from central and northern California into British Columbia continue to burn, contributing to an expansive area of varying density smoke reaching from the Pacific coast eastward as far as Lake Superior and from the southwestern Northwest Territory to the Colorado River near Blythe, CA. Two large regions of moderate density were observed, one from a wildfire complex in northwest British Columbia eastward into Alberta and central Saskatchewan with the other covering much of the CONUS northwest of a line from Death Valley, CA to Duluth, MN. Residual Smoke from the west coast fires was observed over Hudson Bay this morning.

BLOWING DUST:

Caribbean Sea....
The persistent Saharan Dust layer extending across the Atlantic was moving westward covering much of the Caribbean Sea and has reached the Yucatan peninsula and Central America this morning.

Westbrook

Tuesday, August 7, 2018

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 0300Z August 8, 2018.

NESDIS IS INVESTIGATING THE UTILITY OF THIS TEXT NARRATIVE. IF YOU FIND THIS PRODUCT VALUABLE, PLEASE SEND AN EMAIL RESPONSE TO THE FOLLOWING ADDRESS INDICATING HOW YOU AND/OR YOUR AGENCY USE THE INFORMATION. THANK YOU. SEND EMAIL RESPONSES TO: SSDFireTeam@noaa.gov.

SMOKE:
Western and central North America....
Large wildfires from southern, central and northern California and central Oregon into northern British Columbia continue to burn and emit thick smoke, contributing to an expansive area of varying density smoke reaching from the Pacific coast eastward as far as Lake Superior Fires. The California fires are emitting smoke in a southerly direction that is offshore west of Baja California. Fires in Utah, Colorado, and Arizona had the smoke shift from a southwest direction to a east southeast direction throughout the evening.

BLOWING DUST:

Caribbean Sea....
Saharan Dust was observed moving across the Caribbean Sea this morning and afternoon and evening with a reinforcing shot moving across the Atlantic. All of this dust was moving west.

Westbrook

Tuesday, August 7, 2018

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 1802Z August 7, 2018.

NESDIS IS INVESTIGATING THE UTILITY OF THIS TEXT NARRATIVE. IF YOU FIND THIS PRODUCT VALUABLE, PLEASE SEND AN EMAIL RESPONSE TO THE FOLLOWING ADDRESS INDICATING HOW YOU AND/OR YOUR AGENCY USE THE INFORMATION. THANK YOU. SEND EMAIL RESPONSES TO: SSDFireTeam@noaa.gov.

SMOKE:
Western and central North America....
Large wildfires from southern, central and northern California and central Oregon into northern British Columbia continue to burn and emit thick smoke, contributing to an expansive area of varying density smoke reaching from the Pacific coast eastward as far as Lake Superior and offshore west of Baja California.

BLOWING DUST:

Caribbean Sea....
Saharan Dust was observed moving across the Caribbean Sea this morning and afternoon and evening with a reinforcing shot moving across the Atlantic. All of this dust was moving west.

Rodriguez

Wednesday, August 8, 2018

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 0300Z August 9, 2018.

NESDIS IS INVESTIGATING THE UTILITY OF THIS TEXT NARRATIVE. IF YOU FIND THIS PRODUCT VALUABLE, PLEASE SEND AN EMAIL RESPONSE TO THE FOLLOWING ADDRESS INDICATING HOW YOU AND/OR YOUR AGENCY USE THE INFORMATION. THANK YOU. SEND EMAIL RESPONSES TO: SSDFireTeam@noaa.gov.

SMOKE:
Much of Canada and the Western and Central US...
Major wildfire activity across portions of the Western US and up into Western Canada was responsible for an enormous mass of varying density smoke covering virtually all of the southern half of Canada along with the Western and Central US. Over the US, the thickest smoke was noted over a good portion of California, Oregon, Washington, Idaho, and Montana as well as the eastern half of Utah, Colorado, and the northern half of Arizona and New Mexico. Moderately dense to locally thicker smoke also stretched across North Dakota and northern Minnesota to the Great Lakes Region. Over Canada, a tremendous wildfire outbreak especially affecting portions of British Columbia resulted in the thickest smoke spreading across British Columbia, Alberta, and Saskatchewan with a bit more narrow swath of moderately dense to locally thicker smoke extending eastward over Manitoba, Ontario, and a portion of Quebec.

BLOWING DUST:
Caribbean Sea....
Saharan Dust was observed moving to the west covering much of the Caribbean region including Puerto Rico, Hispaniola, Cuba, Jamaica, the Bahamas, southern Florida, the eastern Gulf of Mexico, and the Yucatan Peninsula. Additional Saharan dust was visible farther out to the east over the Atlantic to the east of Puerto Rico.

JS

Thursday, August 9, 2018

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 1700Z August 9, 2018.

NESDIS IS INVESTIGATING THE UTILITY OF THIS TEXT NARRATIVE. IF YOU FIND THIS PRODUCT VALUABLE, PLEASE SEND AN EMAIL RESPONSE TO THE FOLLOWING ADDRESS INDICATING HOW YOU AND/OR YOUR AGENCY USE THE INFORMATION. THANK YOU. SEND EMAIL RESPONSES TO: SSDFireTeam@noaa.gov.

SMOKE:
Much of Canada and the US with the possible exception of the Southeastern US...
The ongoing significant amount of wildfire activity scattered across portions of the Western US and Western Canada continued to emit large quantities of smoke with an enormous area of varying density smoke blanketing much of the southern half of Canada though portions of northern Ontario and northern Quebec and Hudson Bay may be mainly free of smoke. The smoke also covered a good portion of the US with the possible exception of the Southeastern US from eastern Texas and eastern Oklahoma to the Carolinas, Georgia, and Florida. In greater detail, an area of thicker smoke from wildfires in Utah and western Colorado was visible spreading southward over southern Utah, southwestern Colorado, northwestern New Mexico, and northern Arizona. Thick smoke from wildfires in California, southwestern Oregon, portions of Washington state and Idaho was noted roughly across the northern half of California, much of Oregon and Washington, and up over northern Idaho and into western Montana. A large area of moderately dense to thick smoke attributed to both wildfire activity in the Western US and over Western Canada could be seen over much of British Columbia, Alberta, Saskatchewan, and far southern Ontario in Canada and stretching from Montana eastward over the Dakotas and the Great Lakes Region to northern New York in the northern US. Thinner density smoke was visible over portions of the Central and South Central US as well as the Ohio Valley Region, the Middle Atlantic Region, and the Northeast.

BLOWING DUST:
Caribbean Region/Southern Florida/Gulf of Mexico...
The mass of Saharan Dust continued to be visible moving to the west covering much of the Caribbean region including Puerto Rico, Hispaniola, Cuba, Jamaica, the Bahamas, southern Florida, the eastern and southern Gulf of Mexico, and the Yucatan Peninsula. Additional Saharan dust was visible farther out to the east over the Atlantic to the east of Puerto Rico.

JS

VI. News and Social Media reports

A. News Media

1. July 30, 2018

KEYT.com: *California Wildfires impacting air quality in San Luis Obispo*

News

By NewsChannel 3-12
Published July 30, 2018 9:19 pm

California Wildfires impacting air quality in San Luis Obispo

The San Luis Obispo County Air Pollution Control District and the County Health Department say the smoke from the wildfires in California is impacting air quality in San Luis Obispo.

County Officials say the smoke impacts were are their greatest at 2 p.m. Monday in the Eastern and Central parts of San Luis Obispo including Paso Robles and Atascadero. They say coastal air quality could deteriorate as the smoke plume spreads.

"Changing winds make it difficult to predict which areas of the county may be most affected as the week progresses. However, until the fires are put out, smoke will likely be intermittently present in our region," said SLO County Officials.

The County of San Luis Obispo has released the following air quality alert.

If you smell smoke or see ash fall, County officials recommend you take precautions and use common sense to reduce the harmful health effects associated with smoke exposure. When it is obvious that the smoke is in the air, individuals should avoid strenuous outdoor activity and remain indoors as much as possible. These precautions are especially important for people with existing respiratory illness and heart conditions, as they are particularly vulnerable to the health effects of declining air quality. If smoke impacts increase, healthy people could be affected as well. If a cough, shortness of breath, wheezing, exhaustion, light-headedness or chest pain occurs, outdoor activity should be stopped immediately, and the affected person should seek medical attention. More information can be found at slocleanair.org/air-quality/wildfire.

To clean ash, please do the following: use a damp cloth and spray areas lightly with water, directing ash-filled water to ground areas, and away from the runoff system; take your vehicle to the car wash; wash off toys that have been outside in the ash; clean ash off pets; due to the corrosive nature of ash, avoid any skin contact with the ash (wear gloves, long-sleeved shirts); and do not use leaf blowers. Please note, if you have existing heart or lung conditions, avoid doing ash clean-up yourself or anything else that stirs the particles back up into the air. Besides, do not allow children to play in the ash.

APCD and County officials will continue to closely monitor smoke impacts and air quality in San Luis Obispo County. By following the air quality index (AQI), the public can also monitor real-time air quality throughout SLO County. The AQI focuses on health effects individuals may experience within a few hours or days after breathing polluted air. The current and forecasted AQI is available via the APCD website: slocleanair.org. Sign up to receive the daily AQI air quality forecast via email by subscribing online at enviroflash.info, sign up for our AirAware text notifications and check our Twitter feed for the latest updates (@slocleanair).

The San Luis Obispo County Air Pollution Control District also issued a Better Breather Alert warning residents throughout the county about drifting wildfire smoke — the second such alert the agency has released in two weeks.

For updates on the Turkey Fire, follow Cal Fire San Benito-Monterey on Twitter at @CALFIREBEU. For updates on air quality throughout San Luis Obispo County, visit slocleanair.org.

• • •

2. July 31, 2018

San Luis Obispo Tribune: *Air quality alert: Smoke from California wildfires impacting SLO County*

THE TRIBUNE

ENVIRONMENT

Air quality alert: Smoke from California wildfires is impacting SLO County

BY LINDSEY HOLDEN
JULY 31, 2018 01:07 PM, UPDATED JULY 31, 2018 01:19 PM

Firefighters battle a flare-up near Buckhorn Summit on Hwy 299 during the Carr Fire in Trinity County on Monday, July 30, 2018, as families begin to return to burned areas in Redding.
BY PAUL KITAGAKI | KAYLA FITZGERALD

Only have a minute? Listen instead
-01:47
Powered by Trinity Audio

Air quality in San Luis Obispo County this week will be impacted by smoke from the wildfires burning throughout the state.

The San Luis Obispo County Air Pollution Control District (APCD) and the County Health Department issued an alert on Monday warning residents about a spreading smoke plume that's causing a decline in air quality, especially in Paso Robles, Atascadero and the Carrizo Plain area.

The smoke is coming from wildfires that have scorched hundreds of thousands of acres of land throughout Northern, Central and Southern California.

Among the biggest blazes still burning are the Carr Fire in Shasta County, which has burned more than 110,000 acres and killed six people, and the Ferguson Fire in Mariposa County, which has scorched more than 57,000 acres, killed two firefighters and temporarily closed Yosemite Valley.

3. August 6, 2018

KSBY.com: *Fire crews head to Monterey County to fight 'Turkey Fire'*

NEWS

Fire crews head to Monterey County to fight 'Turkey Fire'

By: Site Administrator
Posted at 1:34 PM, Aug 06, 2018 and last updated 1:34 PM, Aug 06, 2018

Local fire crews sent help to fight a wildfire in Monterey County Monday morning.

CAL FIRE SLO said they were sending equipment and fire personnel to battle a vegetation fire near Turkey Flat Road within southern Monterey County.

The "Turkey Fire" was about 100 acres just before 1:30 p.m., with the potential to grow to about 1,000 acres, according to fire officials.

No structures were threatened at the time.

> *CAL FIRE/San Luis Obispo County Fire Department sending personnel and equipment to assist with a reported vegetation fire off Turkey Flat Road within southern Monterey County. @calfirebeu*
>
> *— CAL FIRE SLO (@CALFIRE_SLO) August 6, 2018*

No other information was given.

San Luis Obispo Tribune: *Heavy smoke from 2,000-acre fire near Parkfield hits SLO County*

THE TRIBUNE

ENVIRONMENT

Heavy smoke from 2,000-acre fire near Parkfield hits SLO County

BY LINDSEY HOLDEN

AUGUST 06, 2018 03:55 PM, UPDATED AUGUST 07, 2018 10:24 AM

Cal Fire crews battle the Turkey Fire in southern Monterey County on Monday, August 6, 2018. The fire sent heavy smoke into northern San Luis Obispo County. CAL FIRE SAN BENITO-MONTEREY COUNTY

Update Tuesday, 7:45 a.m.:

The Turkey Fire is now 100 percent contained, with 2,225 acres burned.

Original post:

North County residents experienced heavy smoke drifting south from a vegetation fire burning in southern Monterey County on Monday.

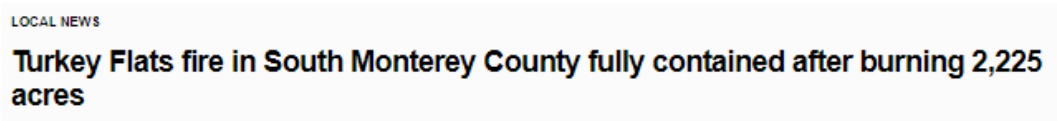
Crews began battling the Turkey Fire about 1 p.m. near Parkfield, according to a Cal Fire San Benito-Monterey tweet. The fire sparked in the California Flats area near Turkey Flat Road.

As of 3:45 p.m., the blaze had grown to 2,225 acres with no structures threatened and 60 percent containment.

On Monday, Cal Fire San Luis Obispo warned North County residents to expect "areas of heavy smoke," and individuals with respiratory conditions were encouraged to limit their time outside.

4. August 7, 2018

Monterey Herald: *Turkey Flats fire in South Monterey County fully contained after burning 2,225 acres*


LOCAL NEWS

Turkey Flats fire in South Monterey County fully contained after burning 2,225 acres

The Turkey Fire, near Parkfield, as seen from firefighting aircraft Monday. (Courtesy Cal Fire)

By JAMES HERRERA | jherrera@montereyherald.com | Monterey Herald
PUBLISHED: August 7, 2018 at 12:00 a.m. | UPDATED: September 11, 2018 at 12:00 a.m.

Parkfield >> A vegetation fire that proved more challenging because of fuel levels and winds, was 100 percent contained Monday night after sparking around 1 p.m., according to Cal Fire.

The Turkey Fire was located in a remote area near Highway 46 and Turkey Flats, near Parkfield in South Monterey County.

"No structures were burned. It's mostly grass and oak woodlands," said Elliot Maiorana, Cal Fire captain.

But the 2,225 acre fire was within about 2 miles south of the solar array that Apple Inc. buys energy from to power its Cupertino campus.

"That was one of the biggest threats," said Maiorana.

The Turkey Fire made its way through rolling hills off Cholame Road near the borders of Monterey, Fresno, Kings, Kern and San Luis Obispo counties.

Maiorana said the biggest driving force of the fire was the wind, brush and timber, and it took two helicopters, four tankers, 15 engines, three bulldozers, two water tenders and about 150 fire personnel to fight the blaze.

By Monday night around 9 p.m. the fire was contained though one engine and one hand crew stayed the night to keep watch on the remnants of the blaze.

James Herrera can be reached at 831-726-4344.

Noozhawk.com: *Smoke from California Wildfires Affecting Santa Barbara County Air Quality*

Local News

Smoke from California Wildfires Affecting Santa Barbara County Air Quality

By Giana Magnoli, Noozhawk Managing Editor | @magnoli
August 7, 2018 | 3:14 p.m.

Smoke from the huge wildfires burning in Northern California has made its way to Santa Barbara County, with air quality conditions forecast to be "moderate" Tuesday and Wednesday, according to the Air Pollution Control District.

Monitoring stations measuring particulate matter showed "moderate" conditions Tuesday afternoon in Santa Maria, Santa Barbara and Las Flores Canyon, with countywide moderate conditions predicted on Wednesday as well.

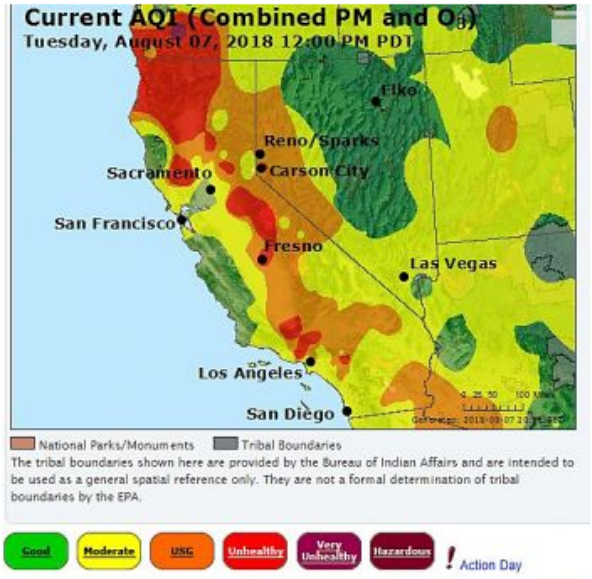
Smoke impacts will likely stick around for the next few days, depending on when firefighters make significant progress on containment for the blazes burning throughout the state, APCD spokeswoman Lyz Hoffman said.

The APCD has been posting daily air quality condition forecasts on its website since the Thomas Fire in December, which created the worst-ever air quality in the county and prompted mass hand-outs of protective masks.

The APCD warned residents Tuesday that "smoky conditions are not always reflected in our monitoring station data.

"If you see or smell smoke where you are — and this is especially true for seniors, children, and people with heart or lung conditions — protect your health by staying inside and avoiding outdoor exercise. If you can, create a 'clean air' room in your home by running a HEPA air purifier in one of your rooms where you spend a lot of time; HEPA purifiers can improve indoor air quality when it is smoky outside."

Firefighters throughout the state are battling huge blazes, including the massive Mendocino Complex Fires — the Ranch Fire and River Fire, with combined acreage that adds up to the largest recorded California wildfire, surpassing the Thomas Fire's 281,893 acres (or 440.5 square miles).



An air quality map from the Environmental Protection Agency shows the impact of California wildfires Tuesday. (Courtesy photo)

Portions of Yosemite National Park have been closed to visitors indefinitely, including Yosemite Valley, as the Ferguson Fire burns nearby, and the deadly Carr Fire continues to devastate Shasta and Trinity counties, including the town of Redding.

San Luis Obispo and Ventura county air pollution control districts also have reported impacts from out-of-county wildfires.

The Ventura County APCD said Tuesday that air quality was unhealthy for sensitive groups in the Simi Valley and Piru areas and "high moderate" elsewhere.

Click here for today's air quality in Santa Barbara County.

Click here for information from APCD on air quality data and creating a clean air room with an air purifier or, as a less expensive option, attaching a HEPA filter to a box fan.

A vegetation burn at the UC Santa Barbara lagoon near Campus Point is planned for this week, but whether it can go forward depends on the weather, Hoffman noted.

The prescribed burn is relatively small (a half-acre, one day burn) and would be coordinated by the Santa Barbara County Fire Department and APCD, in addition to UCSB's Cheadle Center for Biodiversity and Ecological Restoration.

The researchers and UCSB want to conduct the permitted burn before school is back in session, Hoffman noted.

The Santa Barbara County Air Pollution Control District told residents Tuesday that wildfire smoke is impacting local air quality. (Courtesy photo)

— Noozhawk managing editor Giana Magnoli can be reached at gmagnoli@noozhawk.com. Follow Noozhawk on Twitter: @noozhawk, @NoozhawkNews and @NoozhawkBiz. Connect with Noozhawk on Facebook.

5. August 10, 2018

Paso Robles Daily News: *California fires affecting air quality in Paso Robles*

California fires affecting air quality in Paso Robles

Posted: 6:54 am, August 10, 2018 by News Staff

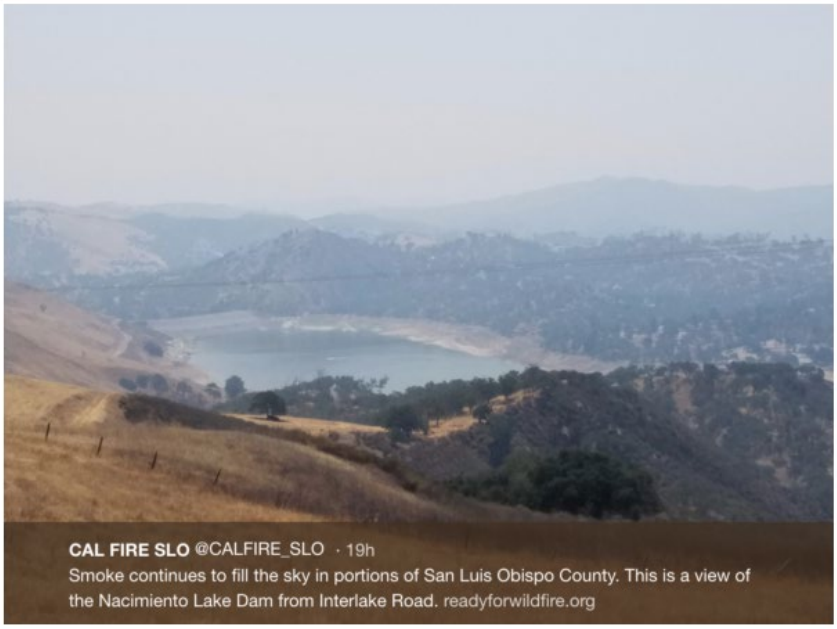


Photo from Cal Fire Twitter.

–The San Luis Obispo (SLO) County Air Pollution Control District Public Health Department and Office of Emergency Services are working in partnership to assess the air quality in order to identify any potential health impacts and to inform the community about safeguarding individual health. At this time, San Luis Obispo County is being impacted by smoke from wildfires across California and by a developing fire in Monterey County named the Turkey Fire.

Expect skies to be hazy and fine particulate concentrations to be higher than normal. Air quality is ranging from "Moderate" to "Unhealthy" for sensitive groups. Changing winds make it difficult to predict which areas of the county may be most affected. However, until the fires are put out, smoke will likely be intermittently present in our region.

If you smell smoke or see ash fall

Air District officials recommend that if you smell smoke or see ash, take precautions and use common sense to reduce your exposure to smoke. All adults and children should:

- Avoid strenuous outdoor activity
- Remain indoors as much as possible
- Close all windows and doors that lead outside to prevent bringing additional smoke inside
- Set any heating/air conditioning/ventilation systems to recirculate

These precautions are especially important for sensitive groups, including children, older adults, and people with existing respiratory illness and heart conditions, as they are particularly vulnerable to the health effects of poor air quality. Families with small children should be aware that even if adults in the household have no symptoms, children may experience symptoms due to their smaller body mass and developing lungs. If smoke increases, healthy people could be affected as well. If you experience a cough, shortness of breath, wheezing, exhaustion, light-headedness or chest pain, stop any outdoor activity immediately and seek medical attention. More information can be found at slocleanair.org/air-quality/wildfire.

For updates

APCD and County officials will continue to closely monitor smoke impacts and air quality in San Luis Obispo County. By following the air quality index (AQI), the public can also monitor real-time air quality throughout SLO County. The AQI focuses on health effects individuals may experience within a few hours or days after breathing polluted air.

The current and forecasted AQI is available via the APCD website: slocleanair.org and you can also follow the SLO County APCD and Public Health Department Twitter feeds for the latest updates (@slocleanair and @SLOPublicHealth). You can also sign up for AirAware alerts right on your phone by visiting their website at SLOCleanAir.org.

San Luis Obispo Tribune: *Smoke from California wildfires prompts air quality warning in SLO County*

THE TRIBUNE

ENVIRONMENT

Smoke from California wildfires prompts air quality warning in SLO County

BY CASSANDRA GARIBAY

AUGUST 10, 2018 05:49 PM, UPDATED AUGUST 10, 2018 06:10 PM

A smoke-filled sunset colored the sky red over San Luis Obispo County Regional Airport and the beacon that marks the facility on Thursday. Large fires burning throughout California have caused hazy, orange skies and poor air quality across the state. DAVID MIDDLECAMP *DMIDDLECAMP@THETRIBUNENEWS.COM*

The SLO County Air Pollution Control District (APCD) sent a "better breather alert" Friday, warning of unhealthy air quality for very sensitive groups in or near Atascadero and Paso Robles.

Air Pollution Control Officer Gary Willey advised that if people smell smoke, have difficulty breathing or see the alerts, they should avoid strenuous activity and limit time outdoors.

The moderate air quality in North County is expected to remain through Wednesday, however the APCD will update information as need be, meteorologist Gary Arcemont said.

“The conditions can change pretty rapidly,” Arcemont said.

Although the air looks hazy in San Luis Obispo, the air quality is unaffected because of drafts moving the smoke along.

Arcemont said topography and coastal winds factor into why the same does not apply to the North County.

To learn more about the impacts of wildfire smoke daily air quality forecast, visit slocleanair.org or airnow.gov.

B. Social Media

1. July 31, 2018

San Luis Obispo County Public Health Department
July 30, 2018 ·

Air quality in parts of SLO County is being affected by drifting wildfire smoke. Right now the effect is most significant in eastern and central parts of SLO County, including Paso Robles and Atascadero. As the smoke plume spreads, the coastal areas may also see haze and smoke.

The current conditions are not cause for health concern for most people. Some groups of people such as very young children, older adults, and people with serious underlying health conditions such as heart or lung disease may be especially sensitive to variations in air quality. People who are very sensitive to air quality will benefit from staying indoors.

Everyone should take common-sense precautions if you smell smoke or see falling ash. This includes:
- Avoid strenuous outdoor activity
- Remain indoors as much as possible
- Set any heating/air conditioning/ventilation systems to recirculate

Anyone who experiences shortness of breath, wheezing, exhaustion, light-headedness or chest pain should immediately stop any outdoor activity and contact their doctor.

Air quality and the related health risk can change rapidly. The Air Pollution Control District is monitoring air quality hourly at nine permanent air monitoring stations located throughout the county and at temporary air monitoring sites set up in areas that may be most impacted. If air quality becomes a health risk, we will alert the public to take precautions.

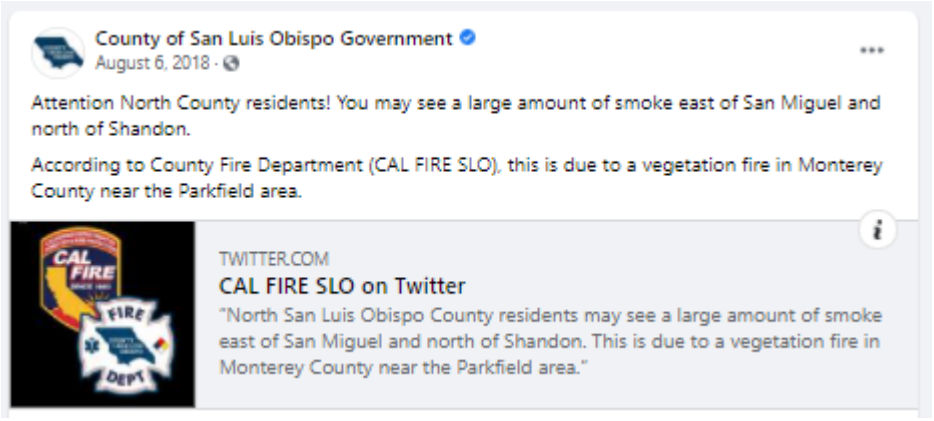
To receive air quality alerts by text message, visit www.slocleanair.org/air-quality-alerts.php and sign up for Air Aware Alerts. You can also follow @slocleanair and @SLOPublicHealth on Twitter.

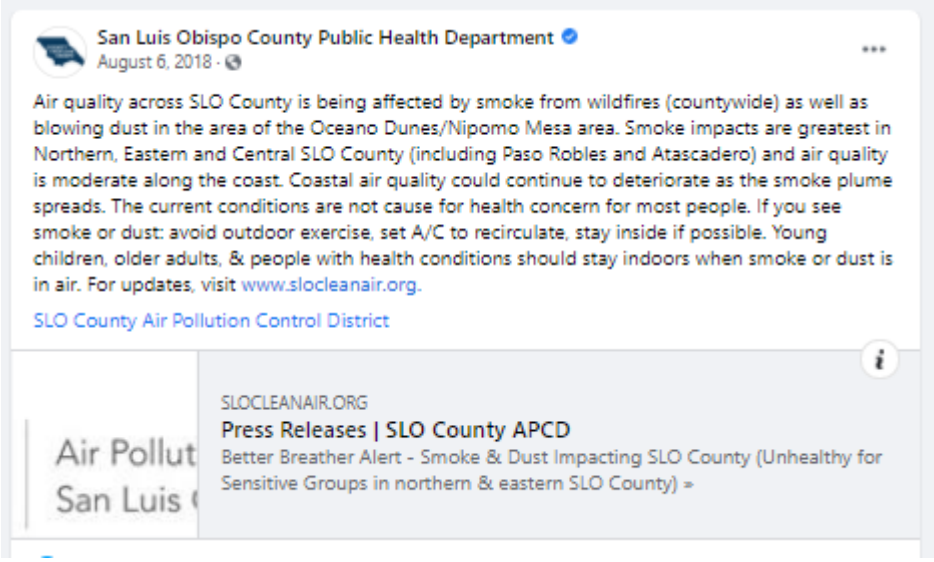
SLO County Air Pollution Control District

AQI Color Code	Good AQI: 0-50	Moderate AQI: 51-100	Unhealthy for Sensitive Grps. AQI: 101-150	Unhealthy AQI: 151-200

Region:	Monday Jul 30	Tuesday Jul 31	Wednesday Aug 1	Thursday Aug 2	Friday Aug 3	Saturday Aug 4
Morro Bay	Good	Good	Good	Good	Good	Good
Paso Robles	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Red Hills	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Atascadero	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
San Luis Obispo	Good	Good	Good	Good	Good	Good
Nipomo - CDF	Good	Good	Good	Good	Good	Good
Nipomo - Mesa2	Good	Good	Good	Good	Good	Good
Nipomo - NRP	Good	Good	Good	Good	Good	Good
Carrizo Plains	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate

2. August 6, 2018





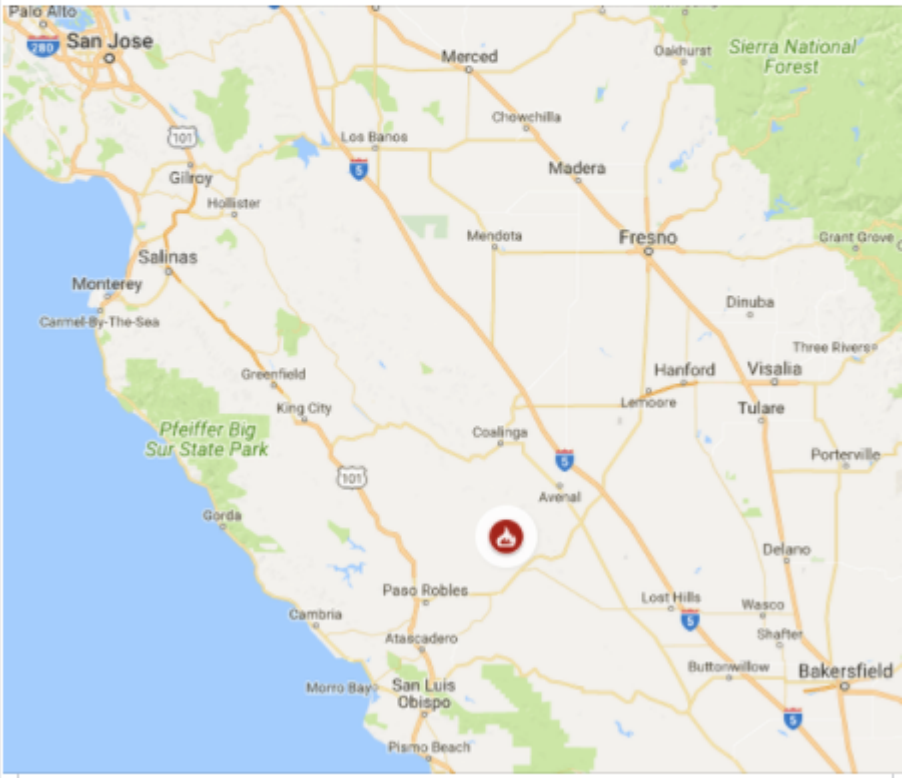
San Luis Obispo County Wildfire Incidents
August 6, 2018 ·

DRIFT SMOKE ADVISORY FOR SAN LUIS OBISPO

UPDATE: 2:40p.m. 8/6/18 VEGETATION FIRE #TurkeyFire [update] near Parkfield (Monterey Co) approximately 600 acres, 0% containment. Please LIKE the Monterey County Wildfire Incidents page and share with your friends. If you have any info, pictures, and or videos please put it in the comment section below.
https://twitter.com/CALFIREBEU [Cal Fire BEU on twitter]

2:00p.m. 8/6/18 VEGETATION FIRE #TurkeyFire Firefighters are battling a 100 acre fire near Highway 46 and Turkey Flats, near Parkfield (Monterey County). Tanker 118 is launching to the fire. Please LIKE the Monterey County Wildfire Incidents page and share with your friends. If you have any info, pictures, and or videos please put it in the comment section below.
https://twitter.com/CALFIREBEU [Cal Fire BEU on twitter]

BROADCASTIFY: San Luis Obispo and Southern Monterey Counties CAL FIRE
https://www.broadcastify.com/listen/feed/14671/web



CAL FIRE
August 6, 2018 ·

Firefighters are battling a 100 acre fire near Highway 46 and Turkey Flats, near Parkfield (Monterey County). #TurkeyFire https://twitter.com/CALFIREBEU

Rancho Azul y Oro Olive Farm
August 6, 2018 ·

We got the smoke before the memo.

Lindsey Holden ▸ SLO County News And Public Safety
August 6, 2018 ·

The latest on smoke from the Turkey Fire in Monterey County. Forward progress has been stopped, according to Cal Fire San Luis Obispo.

SANLUISOBISPO.COM

Heavy smoke from 2,000-acre fire near Parkfield hits SLO County

North San Luis Obispo County, California, residents may experience heavy smoke drifting sout...

2 4 Comments 1 Share

Like Comment Share

Oldest

Michelle Befeler DeHaaff
Stay inside!

Like · Reply · 2y

Author
Rancho Azul y Oro Olive Farm
The smoke is unbelievable. It is blowing right toward us, but again, better than it blowing fire.

SLOCleanAir @SLOCleanAir · Aug 6, 2018

Health Advisory 4 northern #SLOCounty due to smoke impacts from the **#Turkeyfire**. Air District officials recommend that if U smell smoke or see ash, take precautions and use common sense to reduce your exposure to smoke. 4 more information, visit goo.gl/QpnzFr

CAL FIRE BEU @CALFIREBEU · Aug 6, 2018

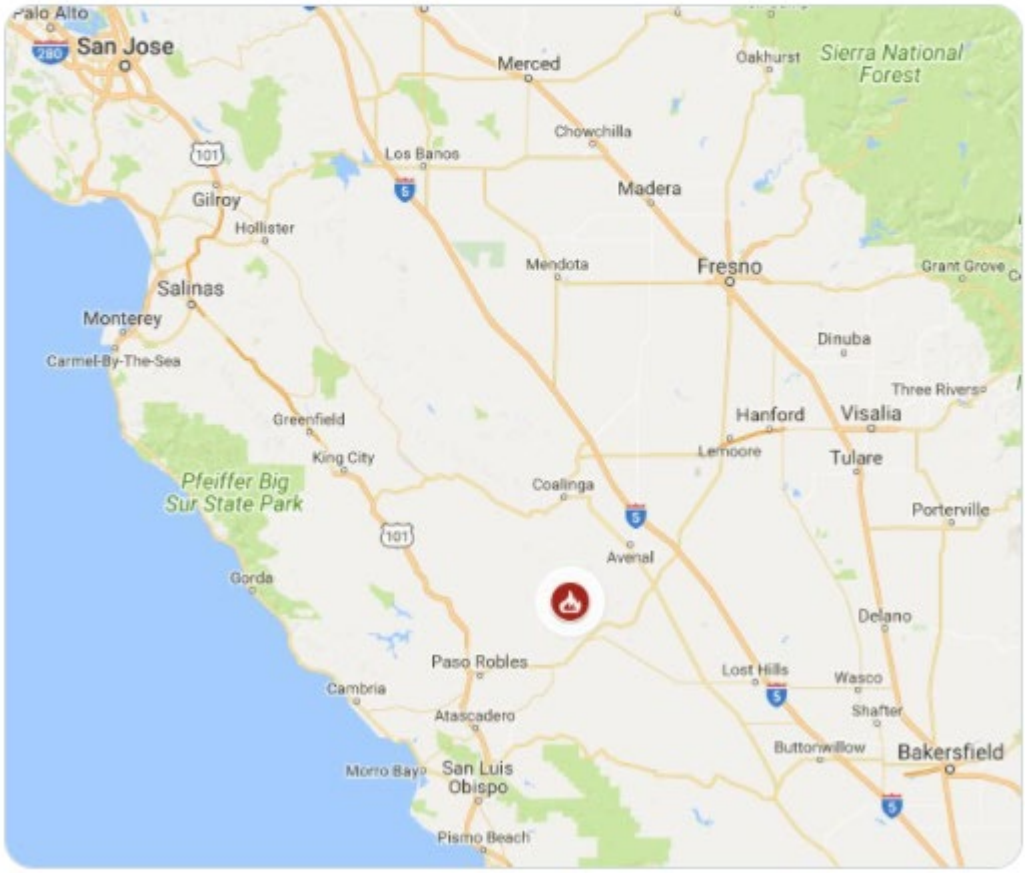
#TurkeyFire [update] near Parkfield (Monterey Co) 60% contained at 2,225 acres. Forward progress has been stopped.

CAL FIRE SLO @CALFIRE_SLO · Aug 6, 2018

Due to the vegetation fire in southern Monterey County #TurkeyIC - residents throughout northern San Luis Obispo County may encounter areas of heavy smoke. Those with respiratory concerns are urged to limit time spent out of doors.

CAL FIRE
@CAL_FIRE

Firefighters are battling a 100 acre fire near Highway 46 and Turkey Flats, near Parkfield (Monterey County). #TurkeyFire twitter.com/CALFIREBEU



KION News 5 46
@KION546

#BREAKING: Vegetation fire burning in Southern Monterey County. #TurkeyFire kion546.com/news/vegetatio...

1:43 PM · Aug 6, 2018 · SocialNewsDesk

KION News 5 46 ✓
@KION546

#TurkeyFire burning in Southern Monterey County grows to 600 acres kion546.com/news/vegetatio...

2:44 PM · Aug 6, 2018 · SocialNewsDesk

CAL FIRE ✓ @CAL_FIRE · Aug 6, 2018

#TurkeyFire [update] near Highway 46 and Turkey Flats, near Parkfield is now 600 acres. twitter.com/CALFIREBEU

KSBW Action News 8 ✓ @ksbw · Aug 6, 2018

#TurkeyFire : Cal Fire crews are battling a 600-acre wildfire burning in south Monterey County near a solar power plant. No structures threatened.

CAL FIRE
@CAL_FIRE

#TurkeyFire [update] near Highway 46 and Turkey Flats, near Parkfield is now 2,225 acres and 60% contained. Forward spread stopped. twitter.com/CALFIREBEU

CAL FIRE BEU

SLOCleanAir
@SLOCleanAir

8/6/2018: Health Advisory in effect for #SLOCounty due to developing #TurkeyFire in #MontereyCounty and smoke from wildfires across CA. #AirQuality currently MODERATE to UNHEALTHY for Sensitive Groups. More details here ow.ly/1yEk30lig7Q

3:52 PM · Aug 6, 2018 · Hootsuite Inc.

SLOCleanAir
@SLOCleanAir

Health Advisory 4 northern #SLOCounty due to smoke impacts from the #Turkeyfire. Air District officials recommend that if U smell smoke or see ash, take precautions and use common sense to reduce your exposure to smoke. 4 more information, visit goo.gl/QpnzFr

3:40 PM · Aug 6, 2018 · Twitter Web Client

KSBY @KSBY · Aug 6, 2018

#UPDATE: The **#TurkeyFire** burned 2,225 acres, forward progress has been stopped
ksby.com/story/38822858...

NWS Bay Area
@NWSBayArea

#TurkeyFire near Parkfield now visible on satellite.

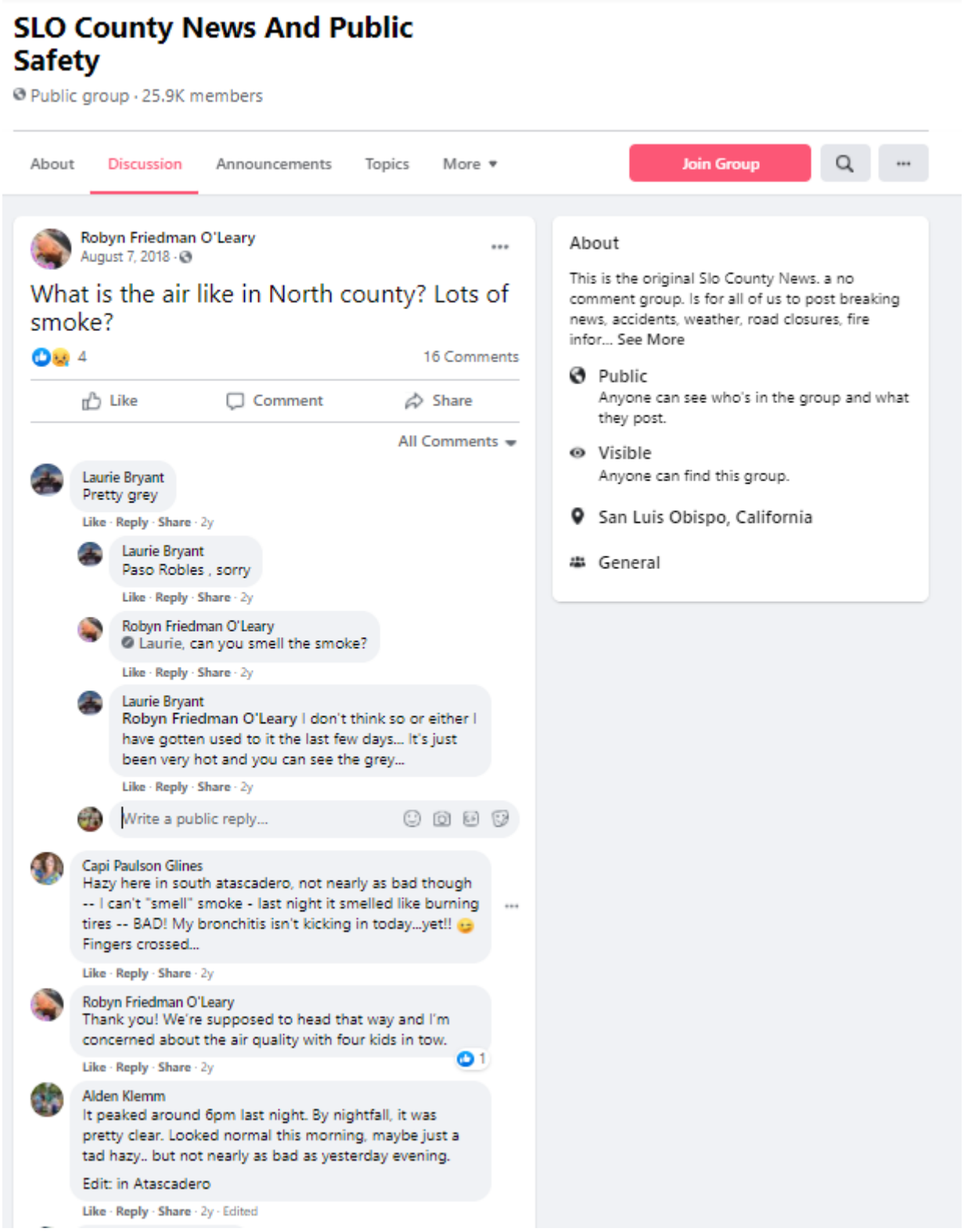
2:36 PM · Aug 6, 2018 · TweetDeck

3. August 7, 2018

SLOCleanAir
@SLOCleanAir

8/7/18: #TurkeyFire is now 100% contained, with 2,225 acres burned, as of 7:45am this morning. Smoke from wildfires is expected to impact #AirQuality in #SLOCounty today for Paso Robles, Atascadero, Carrizo Plains, & Red Hills. Blowing dust in Nipomo CDF, Mesa 2, & NRP as well.

11:40 AM · Aug 7, 2018 · Hootsuite Inc.


SLO County News And Public Safety
Public group · 25.9K members
About
Discussion
Announcements
Topics
More
Join Group
Robyn Friedman O'Leary
August 7, 2018 ·
What is the air like in North county? Lots of smoke?
4
16 Comments
Like
Comment
Share
All Comments
Laurie Bryant
Pretty grey
Like · Reply · Share · 2y
Laurie Bryant
Paso Robles , sorry
Like · Reply · Share · 2y
Robyn Friedman O'Leary
Laurie, can you smell the smoke?
Like · Reply · Share · 2y
Laurie Bryant
Robyn Friedman O'Leary I don't think so or either I have gotten used to it the last few days... It's just been very hot and you can see the grey...
Like · Reply · Share · 2y
Write a public reply...
Capi Paulson Glines
Hazy here in south atascadero, not nearly as bad though -- I can't "smell" smoke - last night it smelled like burning tires -- BAD! My bronchitis isn't kicking in today...yet!! Fingers crossed...
Like · Reply · Share · 2y
Robyn Friedman O'Leary
Thank you! We're supposed to head that way and I'm concerned about the air quality with four kids in tow.
1
Like · Reply · Share · 2y
Alden Klemm
It peaked around 6pm last night. By nightfall, it was pretty clear. Looked normal this morning, maybe just a tad hazy.. but not nearly as bad as yesterday evening.
Edit: in Atascadero
Like · Reply · Share · 2y · Edited
About
This is the original Slo County News. a no comment group. Is for all of us to post breaking news, accidents, weather, road closures, fire infor... See More
Public
Anyone can see who's in the group and what they post.
Visible
Anyone can find this group.
San Luis Obispo, California
General

Alden Klemm
It peaked around 6pm last night. By nightfall, it was pretty clear. Looked normal this morning, maybe just a tad hazy.. but not nearly as bad as yesterday evening.

Edit: in Atascadero

Like · Reply · Share · 2y · Edited

Yvette Barnett
Clear here by the lakes

Like · Reply · Share · 2y

Marilyn Patterson
I'm 10 miles east side of Paso and its bad this morning.

Like · Reply · Share · 2y

Jessica Ralls
I'm in Paso (not far from Walmart). it was nice this morning even though you could see the haze. On the way home from the post office 10 min ago I could smell a little smoke again though

1

Like · Reply · Share · 2y

Melissa Diedrich
We're getting a lot of smoke from the 5fire last night and this morning

Like · Reply · Share · 2y

Heather Pescosolido Thomas
Robyn I just got up to Atascadero - not as bad as you'd think, looks more hazy than anything

Like · Reply · Share · 2y

Steven Bangs
That the smoke from the Northern California wildfires

Like · Reply · Share · 2y

Laurie Bryant
Definitely worse now in Paso... Everything is still and you can smell it

2

Like · Reply · Share · 2y

↪ 1 Reply

Wendy Greene
It's horrible on the plain. Thick as pea soup.

Like · Reply · Share · 2y

CAL FIRE
@CAL_FIRE

#TurkeyFire [final] near Highway 46 and Turkey Flats, near Parkfield is now 100% contained at 2,225 acres. twitter.com/CALFIREBEU

CAL FIRE BEU

4. August 9, 2018

San Luis Obispo County Wildfire Incidents
August 9, 2018 ·

12:00p.m. 8/9/18 Smoke continues to fill the sky in portions of San Luis Obispo County. This is a view of the Nacimiento Lake Dam from Interlake Road. http://www.readyforwildfire.org https://twitter.com/CALFIRE_SLO/status/1027635318185385984 [Cal Fire SLO on twitter]