



Online Exceptional Events Demonstrations Tool

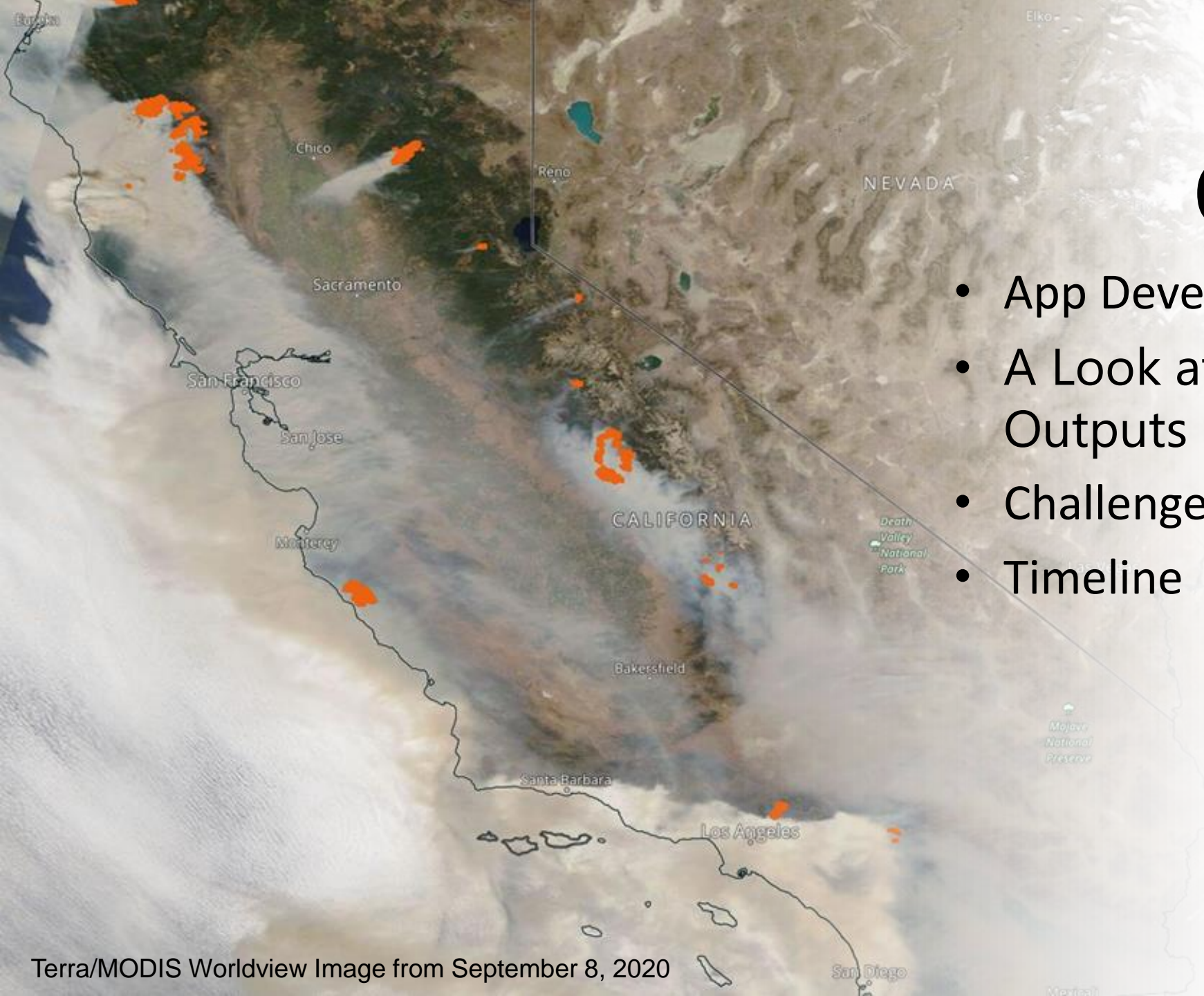
EPA/MJOs Exceptional Events Wildfire and Prescribed Fire Smoke Workshop

February 27, 2024

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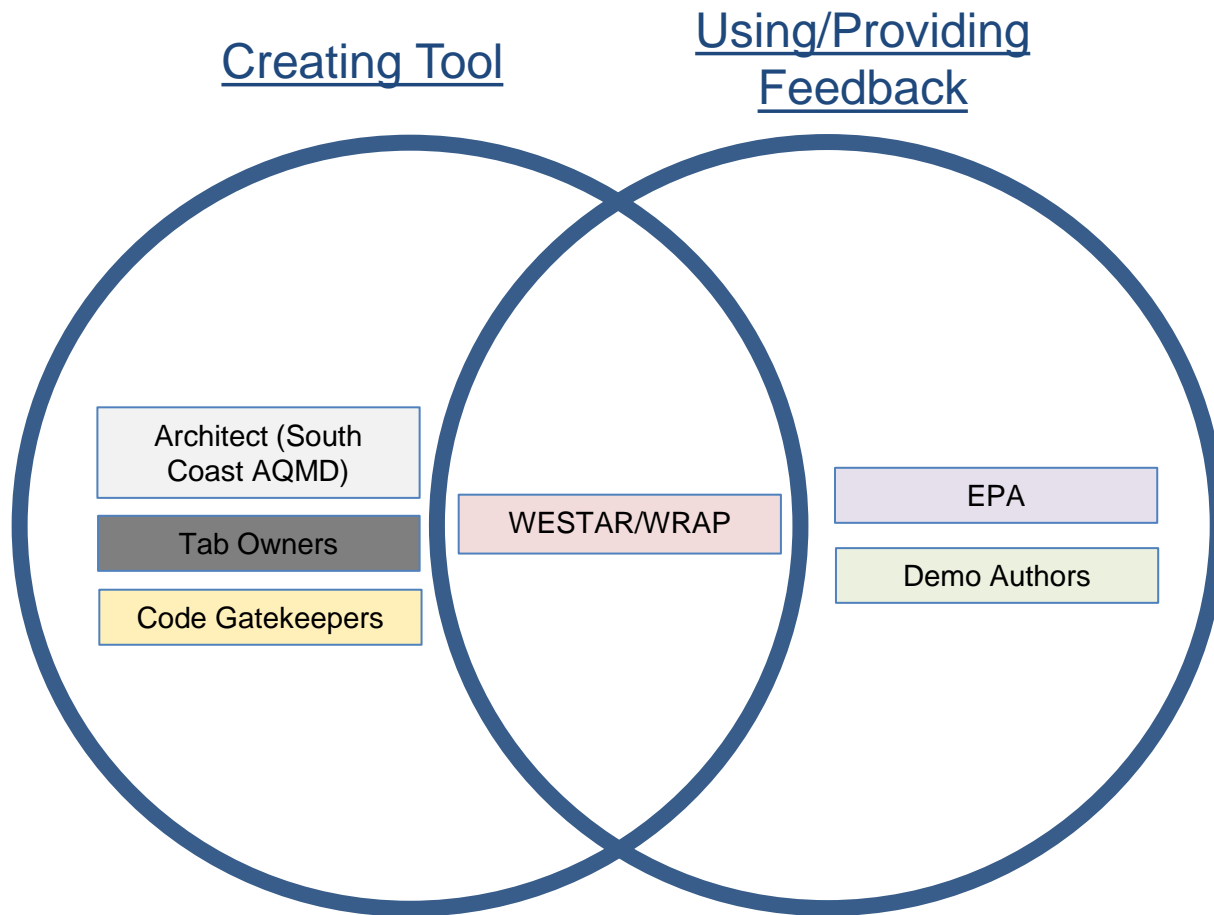
Air Quality Assessment Group
Planning, Rule Development, and Implementation
South Coast Air Quality Management District



Outline

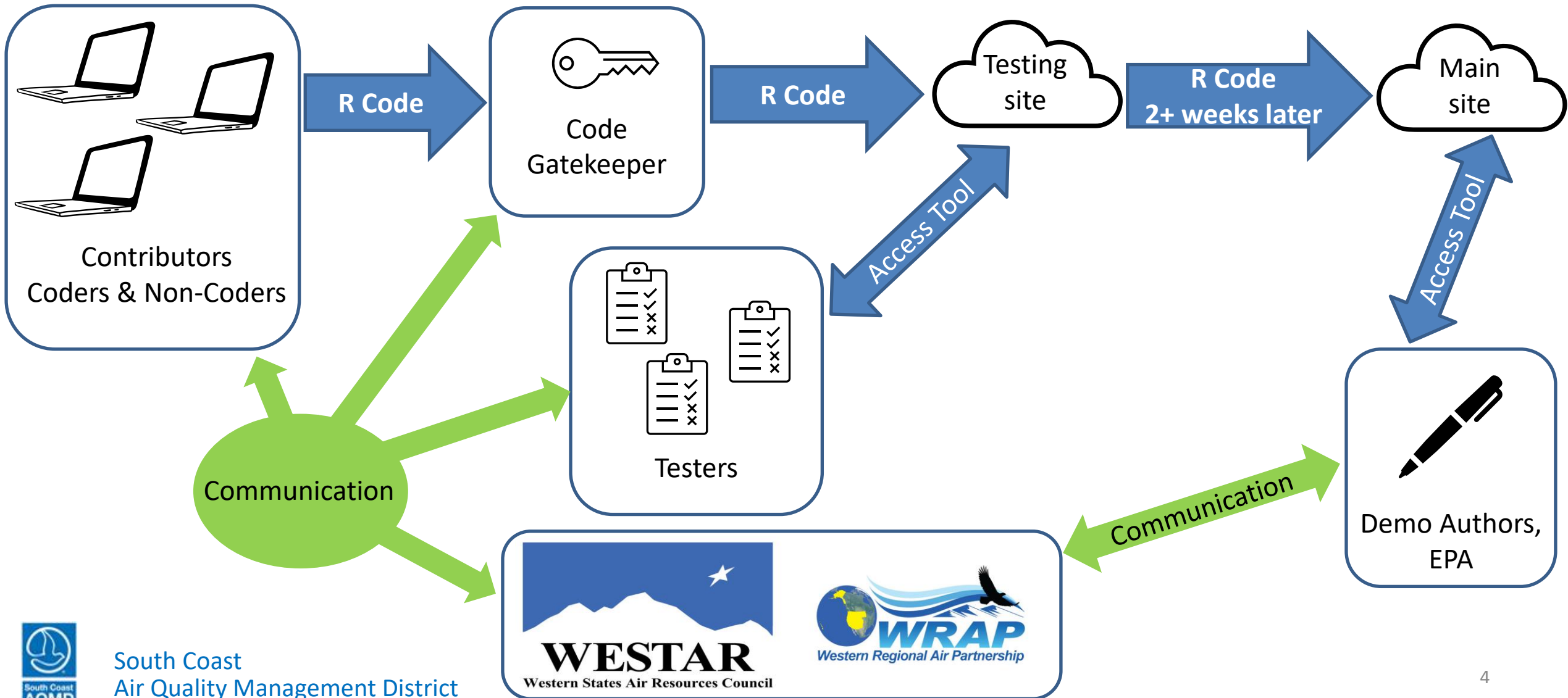
- App Development Process
- A Look at the App and Its Outputs
- Challenges and Successes
- Timeline

Exceptional Event Demonstration Tool



- South Coast AQMD spearheaded a collaboration with WESTAR/WRAP and 18 other air agencies starting in July 2022
- Interactive web-based software using R-shiny platform
 - Development can be completely conducted by scientists
- Currently in development, but enough complete to be useful
- Tool will automate much of the EE demonstration process for several types of events
- Tool and EPA's efforts for streamlining EEs compliment each other

EE Demo Tool Development Workflow

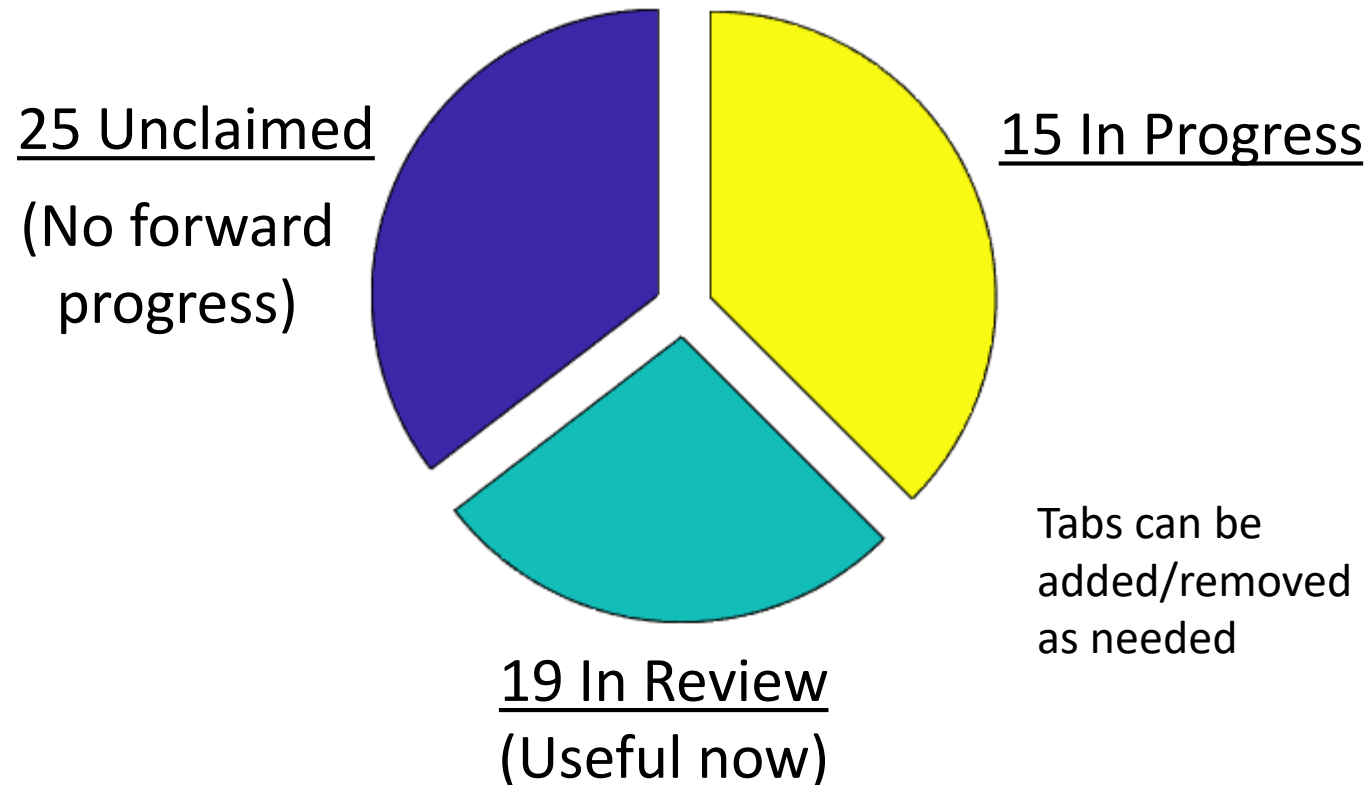


Multi-Agency, Multi-Region Collaboration

People

- 42 people involved
- 22 agencies/organizations
 - Not all in the West

Tabs/Topic areas



General Layout

Tabs to walk through creating EE Demo

EE Demo Tool

https://westar.sinyapps.io/EEDemoTool/_w_64fd09ea/

Exceptional Events Demonstration Development Tool

General Information Event Description Time Sensitive Initial Notification Non-Daily Sections Clear Causal Compile Documents For Contributors

Purpose of Tool:

The purpose of this app is to quasi-automate some of the tasks involved in preparing an Exceptional Events (EE) Demonstration for submission to the EPA. **Use of this app in no way guarantees EPA concurrence for any EE demo submitted to the EPA. EE demos created using this app are subject to the same review process as EE demos that do not use this app.** This interactive app lays the ground work for automating much of the technical data collection required in Exceptional Event Demonstrations. This online tool is a collaborative project among air quality regulatory agencies. It is, and will continue to be, a work in progress. If you are interested in contributing to this project, please contact [Rhonda Payne at WESTAR](#) or [Jay Baker at WESTAR](#). Please also see the 'For Contributors' tabs. Both R coders and non-coders are welcome to contribute.

General Instructions:

To start an EE demo, fill out the information on the 'Event Description' tab. Save the resulting Event Description file (EventDescriptionValues.csv) to a folder on your local computer that is dedicated to this EE Demo. This local folder will be referred to as the project folder. Which tabs appear or disappear depends on the Event Type and Report Type selected on the Event Description tab. Note that all tabs controlled by Event Type are visible if 'Multi Type' is selected, but data cannot be downloaded or plotted on the Event Description page with this selection.

Once the Event Description page is done, most of the other tabs can be used in any order. Be sure to download files created on each tab and save them to the project folder. No data is stored within the app from one session to another, so the files must be saved to the local project folder for future use. In general, most tabs will create 1) a small csv file referred to as the 'Meta file' used for tracking file names for the main report, 2) a zip file containing one Word document for each day of the Event or just one Word document for non-daily tabs, 3) another Meta file for the appendix, and 4) another zip file containing Word document(s) for the appendix. The Word documents will generally end in _Draft.

IMPORTANT: Before you make edits to the _Draft Word files, it is important to change _Draft in the file name to _Edited. This way, your edits won't be over-written if you happen to re-run the tab that created the Word file. If both _Draft and _Edited versions of the same Word file are uploaded on the Compile Documents tab, the _Edited version will be used for compiling and the _Draft version will be ignored.

Tabs create many small Word files

Word files are merged to create report



Input Data that is carried throughout tool

Agency Name (full) My Agency's Name (full)	Agency Name (short) My Agency's Name (short)	Name of Area, e.g., 'South Coast Air Basin' or 'Coachella Valley' My Basin's Name	Name of Event, e.g. 'Bobcat Fire' This Fire Name
Select Event Type PM2.5 Wildfire	Standard of Interest (See EPA NAAQS table) PM2.5 annual (2024)	Select Report Type ⓘ Contiguous dates	Append this text to filenames for easy ID (30 characters max) ⓘ
Select Event START Date: 2024-02-15	Select Event ENDING date (max time span 1 month): 2024-02-19	Select Reference Date (for comparison) 2024-02-14	Select preferred timezone ⓘ US/Pacific
Use Preliminary (AirNow) or Finalized (AQS; ~6 month time lag) Concentration Data? <input checked="" type="radio"/> AirNow Data <input type="radio"/> AQS Data			

New PM2.5 NAAQS is now included in tool

Event information filled in on "Event Description" tab



Event information is carried to the other tabs for creating Word files

Exceptional Events Demonstration Development Tool

General Information Event Description Time Sensitive Initial Notification Non-Daily Sections Clear Causal

Historical Transport Effect

HYSPLIT Meteorology Satellite HMS AOD

Step 3: Output Word File (inside zip file)
Create Word file for this tab, put it in a zip file, and download it:
[Generate Word Report for each day \(zipped\)](#)



Satellite Tab

Step 2: Determine Area of Satellite Image

Date for Satellite Preview

2020-09-12

The step 3 export button will loop through the days of the event, as defined by the Event Description Tab. The date provided here will be used to preview the image below to determine the extent. You can change the date here and it will not impact the days that are downloaded to Word

Imagery Type:

- Aqua (afternoon)
 Terra (morning)

Pre-Defined Satellite Area

California (southern)

Modify Bounding Box Area (if desired)

Please select the closest pre-defined area and then make small adjustments below.

Enter Latitude and Longitude of the SW Corner of the block (default value is based on pre-defined area above)

Latitude of SW Corner of Image

32.1731

Longitude of SW Corner of Image

-122.8771

Enter Latitude and Longitude of the NE Corner of the block (default value is based on pre-defined area above)

Latitude of NE Corner of Image

38.3366

Longitude of NE Corner of Image

-113.9677

Width and Height of image. If you change the lat/longs you will likely want to tweak these. The rough equation is 1km per pixel but there is an adjustment for the curve of the earth.

Width of Image (in pixels)

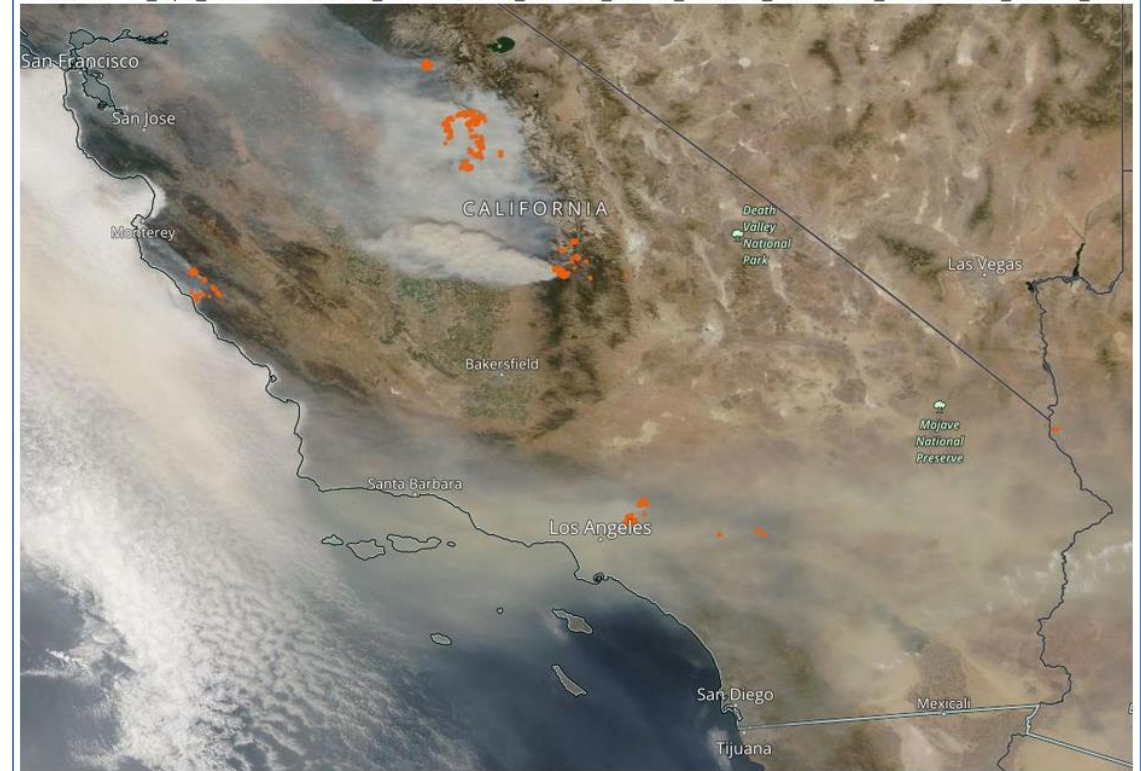
1014

Height of Image (in pixels)

701

Preview image before moving to step 3. You can view other days by changing the Preview Date above. Note: The days that will download in Step 3 are determined by the Start and End Date in the Event Description tab.

URL: https://wvs.earthdata.nasa.gov/api/v1/snapshot?REQUEST=GetSnapshot&TIME=2020-09-12T00:00:00Z&BBOX=32.1731,-122.8771,38.3366,LAYERS=MODIS_Aqua_CorrectedReflectance_TrueColor,MODIS_Combined_Thermal_Anomalies_All,Coastlines_15m,Reference_Features_15m,R



Step 3: Output Word File (inside zip file)

Create Word file for this tab, put it in a zip file, and download it:

[Generate Word Report for each day \(zipped\)](#)



Output from Satellite Tab

Satellite Report for 2020-09-12

Figure [X] shows a NASA Worldview satellite image of the South Coast Air Basin taken on 2020-09-12 contrasted with a similar view from 2020-09-04 ([BEFORE/AFTER] the Bobcat and El Dorado Fires). The Worldview image from 2020-09-12 shows [WRITE DESCRIPTION OF SMOKE IN IMAGE, E.G., WIDESPREAD SMOKE]. The image also shows [WRITE DESCRIPTION, E.G., A FEW, MANY] thermal anomalies (orange dots) in the areas of the Bobcat and El Dorado Fires, indicating that the Bobcat and El Dorado Fires were [WAS/WERE] [WRITE DESCRIPTION, E.G., ACTIVE ON 2020-09-12?].

1st page of output satellite file for 2020-09-12

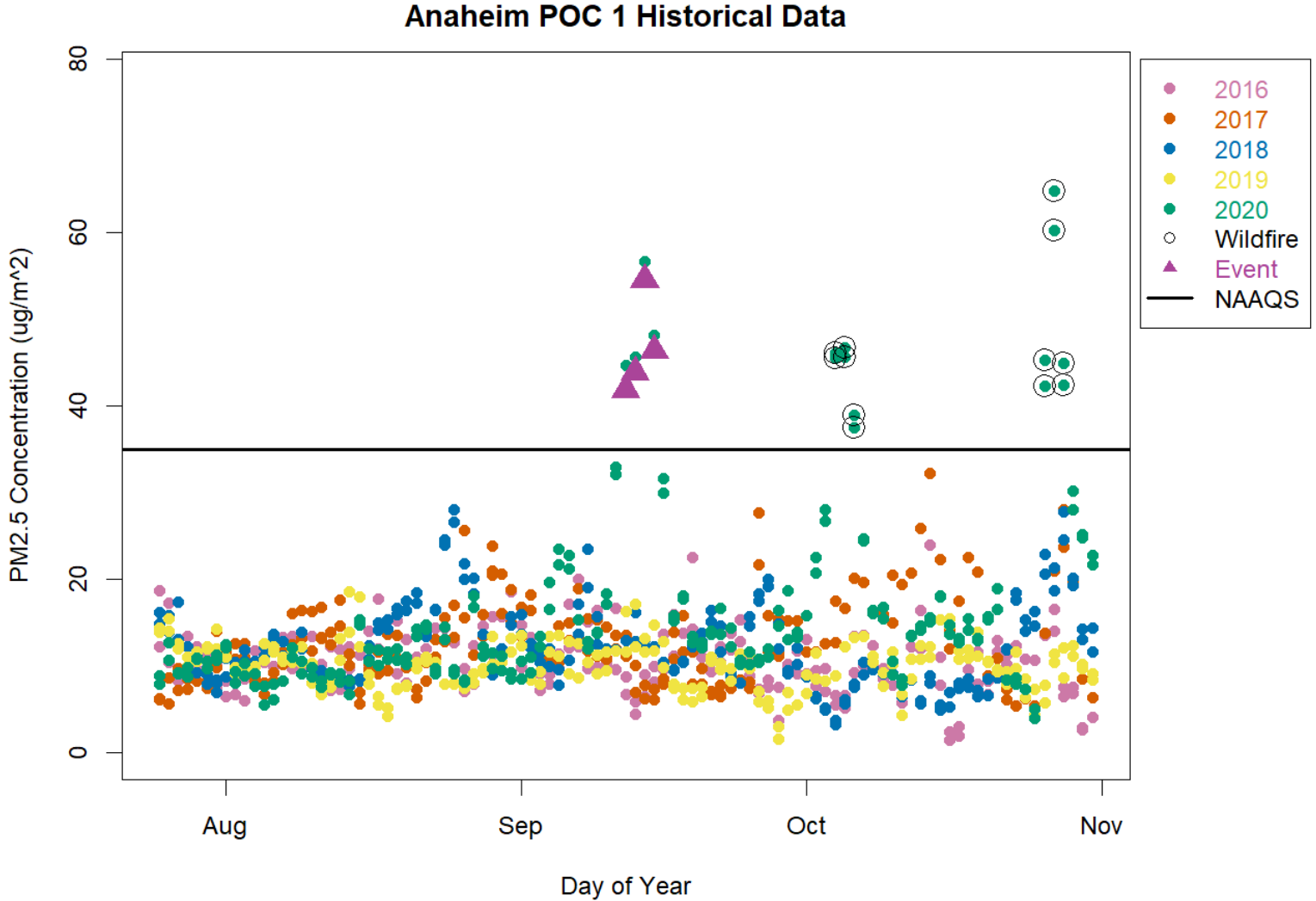
Word file is filled in with information provided

2nd page of output satellite file for 2020-09-12



Figure [X] Worldview Satellite Image of the South Coast Air Basin for 2020-09-04 (top) and 2020-09-12 (bottom). The orange dots are thermal anomalies. Images can be viewed online: <https://wvs.earthdata.nasa.gov/api/v1/snapshot?REQUEST=GetSnapshot&TIME=2020->

Example Historical Analysis Output



Create Draft Reports for Single Events

- An 'Event' is a continuous block of days with exceedances
 - Can be multiple fires, multiple monitors

Draft Bobcat and El Dorado Fires 2020-09-07 to 2020-09-16 Exceptional Event Demonstration (Title Page)

South Coast Air Quality Management District (South Coast AQMD)

South Coast Air Basin

2020-09-07 to 2020-09-16

PM2.5 Wildfire exceptional events demonstration for the PM2.5 24-hour (2006) National Ambient Air Quality Standard (NAAQS)

Authors List: [Fill in]

Introduction

The Bobcat and El Dorado Fires occurred during 2020-09-07 through 2020-09-16 (10 days) in the South Coast Air Basin within the jurisdiction of the South Coast Air Quality Management District (South Coast AQMD). The analyses use 2020-09-04 as a non-event reference day for comparison. This analysis uses AQS Data data. This document is part of a PM2.5 Wildfire exceptional events demonstration for the PM2.5 24-hour (2006) National Ambient Air Quality Standard (NAAQS). [Insert Analysis]

Example sub-section

Sub-section text goes here

Area Description for South Coast Air Basin

The South Coast Air Basin area is located in The region covers [X] square miles and has a population of approximately [Y] people. [Insert description of geography of area, e.g., mountains, bodies of water, etc.]

[Insert map of South Coast Air Basin with terrain, county lines, etc.]

[Description of typical seasonal climate of area. Include descriptions of micro-climates within region (e.g., coastal vs mountain, etc.). Include typical seasonality of storms, wind events, wildfires, etc.]

[Insert map of area and surrounding air agency jurisdictions]

Example sub-section

Sub-section text goes here

Wildfire Description for Bobcat and El Dorado Fires

During 2020-09-07 through 2020-09-16 [edit time if fires burned longer], Bobcat and El Dorado Fires [was/were] burning [in and near] the South Coast Air Basin. Smoke from these fires ... As a result of the wildfire smoke, daily [PM2.5/PM10] concentrations measured at [X] stations exceeded the PM2.5 24-hour (2006) during 2020-09-07 through 2020-09-16. The location[s] of the Bobcat and El Dorado Fires [are/is] shown below in Figure [X]. The fires are summarized in Table [X].

[Insert map showing locations of fires in/near jurisdiction]

[Insert table summarizing fire(s): name, dates burning (may be longer than exceptional event), total acres burned, location (cities and lat/lon), # fatalities, # injuries, # structures destroyed, # structures damaged]

[from EPA Guidance, section 2: "Maps and tables of the wildfire event information including location, size, and extent. The maps should also include the location of the monitor(s) where data exclusion is requested. This map and table should clearly identify the wildfire(s) believed by the air agency to have caused the exceedance, not just a list of wildfires occurring within the jurisdiction of the submitting air agency." ... "A brief explanation and identification of the cause and point of origin for the event wildfire(s) (to the extent known)."]

Description of Fire #1

The [Name Fire] started in [location] at approximately [time] on [date] near [geographic reference point, e.g., nearby city]. The [Name Fire] resulted in [description of impacts of fire, stats from table above, evacuations, etc.]

[Insert map of area of Fire #1 and any cities/locations mentioned in the narrative. Mark the fire ignition location.]

Describe day-by-day progression of fire, e.g., # acres burned each day, containment percentage.

[Insert map of day-by-day fire progression created by inter-agency fire response group, these can sometimes be found on the maps tab on the inciveb.wildfire.gov page for the specific fire]

[Insert table showing daily fire growth for this fire example columns: date, acreage, containment, 1-day fire growth, references]

Cause of Fire #1

The [Name Fire] was caused by [...] in ... near ... at [time] on [date], see [reference appendix with screenshots of newspaper articles describing cause, etc.]. The [Name Fire] [meets?] the U.S. E.P.A. definition of a wildfire on wildland, see [Reference section of report for Human activity that is unlikely to recur or natural event].

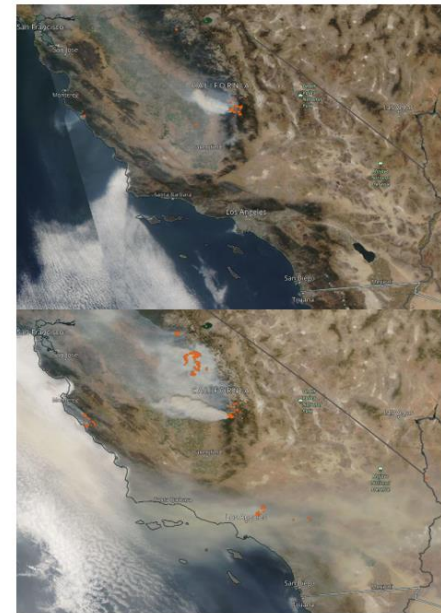


Figure [X] Worldview Satellite Image of the South Coast Air Basin for 2020-09-04 (top) and 2020-09-12 (bottom). The orange dots are thermal anomalies. Images can be viewed online: <https://www.earthdata.nasa.gov/api/v1/snapshot?REQUEST=GetSnapshot&TIME=2020->

References

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**Disclaimer: The text shown is not for a real EE demo.
It is example output from the tool.**

South Coast
Air Quality Management District



Merge reports together for Multi-Event reports

Draft 2020 Wildfires and Fireworks Exceptional Event Demonstration

South Coast Air Quality Management District (South Coast AQMD)
 PM2.5 Fireworks exceptional events demonstration for the PM2.5 24-hour (2006) National Ambient Air Quality Standard (NAAQS) in the South Coast Air Basin for the following events:
 Independence Day Fireworks (2020-07-04 to 2020-07-05)
 Silverado and Blue Ridge Fires (2020-10-26 to 2020-10-28)
 Bond and Airport Fires (2020-12-03)
 Authors List: [Fill in]

Introduction

This report describes three 2020 Wildfires and Fireworks exceptional events from 2020-07-04 to 2020-07-05 for the PM2.5 24-hour (2006) National Ambient Air Quality Standard (NAAQS). The events occurred in the South Coast Air Basin, within the jurisdiction of the South Coast Air Quality Management District (South Coast AQMD). The table below shows a list of exceedances described in this report.

Table 1: Exceedances for 2020-07-04 to 2020-07-05 2020 Wildfires and Fireworks.

Date	Local Site Name	AQS Site ID	POC	Parameter Code	Conc.*
2020-07-04	Anaheim	06-059-0007	1	88101	51.0
2020-07-04	Anaheim	06-059-0007	3	88101	55.0
2020-10-26	Anaheim	06-059-0007	1	88101	42.3
2020-10-26	Anaheim	06-059-0007	3	88101	45.3
2020-10-27	Anaheim	06-059-0007	1	88101	60.2
2020-10-27	Anaheim	06-059-0007	3	88101	64.8
2020-10-28	Anaheim	06-059-0007	1	88101	42.4
2020-10-28	Anaheim	06-059-0007	3	88101	44.9
2020-07-05	Azusa	06-037-0002	21	88101	78.2
2020-10-27	Azusa	06-037-0002	21	88101	50.3
2020-07-04	Compton	06-037-1302	1	88101	67.5
2020-07-05	Compton	06-037-1302	1	88101	63.0
2020-10-27	Compton	06-037-1302	1	88101	40.4
2020-12-03	Compton	06-037-1302	1	88101	35.8
2020-07-05	Fontana	06-071-2002	1	88101	41.9

Draft Independence Day Fireworks 2020-07-04 to 2020-07-05 Exceptional Event Demonstration (Title Page)

South Coast Air Quality Management District (South Coast AQMD)
 South Coast Air Basin
 2020-07-04 to 2020-07-05
 PM2.5 Fireworks exceptional events demonstration for the PM2.5 24-hour (2006) National Ambient Air Quality Standard (NAAQS)
 Authors List: [Fill in]

Introduction

The Independence Day Fireworks occurred during 2020-07-04 through 2020-07-05 (2 days) in the South Coast Air Basin within the jurisdiction of the South Coast Air Quality Management District (South Coast AQMD). The analyses use 2020-07-01 as a non-event reference day for comparison. This analysis uses AQS Data data. This document is part of a PM2.5 Fireworks exceptional events demonstration for the PM2.5 24-hour (2006) National Ambient Air Quality Standard (NAAQS). [Insert Analysis]

Example sub-section

Sub-section text goes here

Characteristics of Non-Event PM2.5 for South Coast Air Basin

[Describe typical concentrations, emissions sources, seasonal patterns, etc. under typical (non-event) circumstances. Describe typical meteorological impacts on pollutant concentrations (e.g., sunlight, storms, fog, humidity, ventilation). Describe typical holiday (e.g., 4th of July) impacts. Could describe how much PM2.5 is primary vs secondary.]

Example sub-section

Sub-section text goes here

Emissions

The Independence Day Fireworks occurred during 2020-07-04 through 2020-07-05 (2 days) in the South Coast Air Basin within the jurisdiction of the South Coast Air Quality Management District (South Coast AQMD). The analyses use 2020-07-01 as a non-event reference day for comparison. This analysis uses AQS Data data. This document is part of a PM2.5 Fireworks exceptional events demonstration for the PM2.5 24-hour (2006) National Ambient Air Quality Standard (NAAQS). [Insert Analysis]

Draft Silverado and Blue Ridge Fires 2020-10-26 to 2020-10-28 Exceptional Event Demonstration (Title Page)

South Coast Air Quality Management District (South Coast AQMD)
 South Coast Air Basin
 2020-10-26 to 2020-10-28
 PM2.5 Wildfire exceptional events demonstration for the PM2.5 24-hour (2006) National Ambient Air Quality Standard (NAAQS)
 Authors List: [Fill in]

Introduction

The Silverado and Blue Ridge Fires occurred during 2020-10-26 through 2020-10-28 (3 days) in the South Coast Air Basin within the jurisdiction of the South Coast Air Quality Management District (South Coast AQMD). The analyses use 2020-10-24 as a non-event reference day for comparison. This analysis uses AQS Data data. This document is part of a PM2.5 Wildfire exceptional events demonstration for the PM2.5 24-hour (2006) National Ambient Air Quality Standard (NAAQS). [Insert Analysis]

Example sub-section

Sub-section text goes here

Area Description for South Coast Air Basin

The South Coast Air Basin area is located in The region covers [X] square miles and has a population of approximately [Y] people. [Insert description of geography of area, e.g., mountains, bodies of water, etc.]

[Insert map of South Coast Air Basin with terrain, county lines, etc.]

[Description of typical seasonal climate of area. Include descriptions of micro-climates within region (e.g., coastal vs mountain, etc.). Include typical seasonality of storms, wind events, wildfires, etc.]

[Insert map of area and surrounding air agency jurisdictions]

Example sub-section

Sub-section text goes here

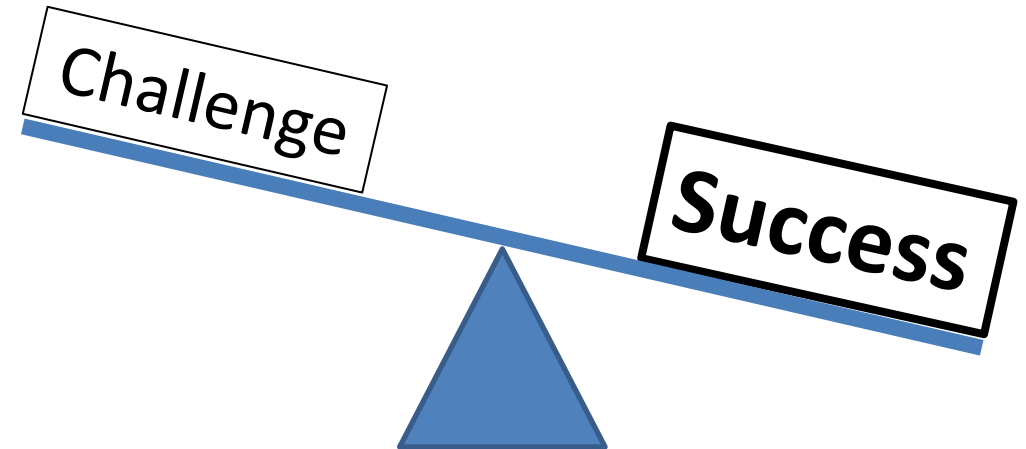
Disclaimer: The text shown is not for real EE demos. It is example output from the tool.



South Coast
 Air Quality Management District

Challenges and Successes

- Recruiting contributors
- Maintaining the right amount of communication
- Writing R code
 - R shiny (app-writing) is extra learning curve
- Prioritizing suggestions/requests within time for writing code
- Formatting Word Docs
 - Accessibility



Why and How to Get Involved

App is useful even before it is complete



Tabs can be sub-divided if people want to contribute to part of a topic area



- Contributing to the tool development may be the fastest route to completing EE Demos for your agency especially if multiple EE Demos are needed



The people who are involved in developing, testing, or using the app are the people who will have a say in what the app can do



Coders and Non-Coders Welcome
WESTAR/WRAP Coordination Hub:

Rhonda Payne rpayne@westar.org

Jay Baker jbaker@westar.org



Timeline

- Development moves at the speed of collaboration
- Is tool useful now?
 - Yes
 - See tab status table in General Information tab
- Will it be more useful in future?
 - Much more
- Would you like it to move faster?
 - Join the fun (or volun-tell your staff)



Tab Status Table

Status of Tool:

Note that the Component Keyword will generally appear in filenames generated by a tab. The 'Event.Type' and 'Report.Type' columns indicate the settings on the Event Description tab for which a given tab will be visible. Tabs that are labeled as 'skeleton' output files with generic language and don't provide any analysis. These tabs may still be useful for creating base documents from which to work that can be merged with other Word files from this tool. Tabs with 'skeleton' status may also have links to relevant resources at the bottom. Tabs that are 'UNCLAIMED' do not have anyone working on them. Work on developing this tool moves at the speed of collaboration. If you would like to contribute, please contact [Rhonda Payne at WESTAR](#) or [Jay Baker at WESTAR](#).

'EPA Guidance' in the table below refers to this site: [EPA Guidance](#).

Some of the time-sensitive tabs, e.g., 'Fire & Smoke Map' are set up with the possibility of doing daily, non-daily, and real-time versions of the Word files output. As such, those tabs may appear multiple times in the table below.

Click 'View Status of Tabs' to show or reset table. The number of entries shown can be selected below. Click on a column name to sort the table by that column. The drop-down menus below can be used to reduce the number of rows shown in the table below.

Note that the drop-down menus below are only used for viewing the table below and do not affect files output on other tabs. (Selections made on the Event Description tab impact output files on other tabs.)

View Status of Tabs

Select Event Type
O3 Wildfire

Select Report Type
Contiguous dates

Select Tab Task
All

Display status of each tab:

Show entries Search:

	Tab.Name	Purpose	Tier	Status	Up.for.Review	Location.in.Tool	Tab.Task	Event.Type	Report.Type	Component.Keyword
1	General Information	General information about this tool and exceptional events		Functionally complete	Yes	Top-line tab	Instructions, Resource links	PM2.5 Wildfire,PM2.5 Fireworks,PM2.5 Prescribed Fire,PM2.5 Modify Base Year Design Values,O3 Wildfire,O3 Prescribed Fire,PM10 Dust,PM10 Wildfire,PM2.5 ARA,Multi Type	Contiguous dates,Multiple noncontiguous episodes,Debugging mode	GeneralInstructions
2	Event Description	Input event parameters and download criteria pollutant data		Functionally complete	Yes	Top-line tab	Data download, Output plots	PM2.5 Wildfire,PM2.5 Fireworks,PM2.5 Prescribed Fire,PM2.5 Modify Base Year Design Values,O3 Wildfire,O3 Prescribed Fire,PM10 Dust,PM10 Wildfire,PM2.5 ARA,Multi Type	Contiguous dates,Multiple noncontiguous episodes,Debugging mode	EventDescription
3	Initial Notification	Initial Notification of Potential Exceptional Event (40 CFR 50.14(c)(2), see also Section 1 of EPA Guidance) Note: Initial Notification is kept as a separate document and does not merge with other Word Documents on Compile Documents Tab.		UNCLAIMED/skeleton	no	Top-line tab	Output Word files, Resource links	PM2.5 Wildfire, PM2.5 Fireworks, PM2.5 Prescribed Fire, O3 Wildfire, O3 Prescribed Fire,PM10 Dust,PM10 Wildfire,Multi Type	Contiguous dates,Multiple noncontiguous episodes,Debugging mode	InitialNotif
5	Title Page	Create title page for single-event reports		skeleton	no	Non-Daily Sections	Output Word files	PM2.5 Wildfire,PM2.5 Fireworks,PM2.5 Prescribed Fire,PM2.5 Modify Base Year Design Values,O3 Wildfire,O3 Prescribed Fire,PM10 Dust,PM10 Wildfire,PM2.5 ARA,Multi Type	Contiguous dates,Debugging mode	TitlePage



Many thanks to WESTAR/WRAP and the agencies involved!!



Thank you!



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