User's Guide to the Qlik Web Application for the Expedited Modeling of Burn Events Results (EMBER) Dataset

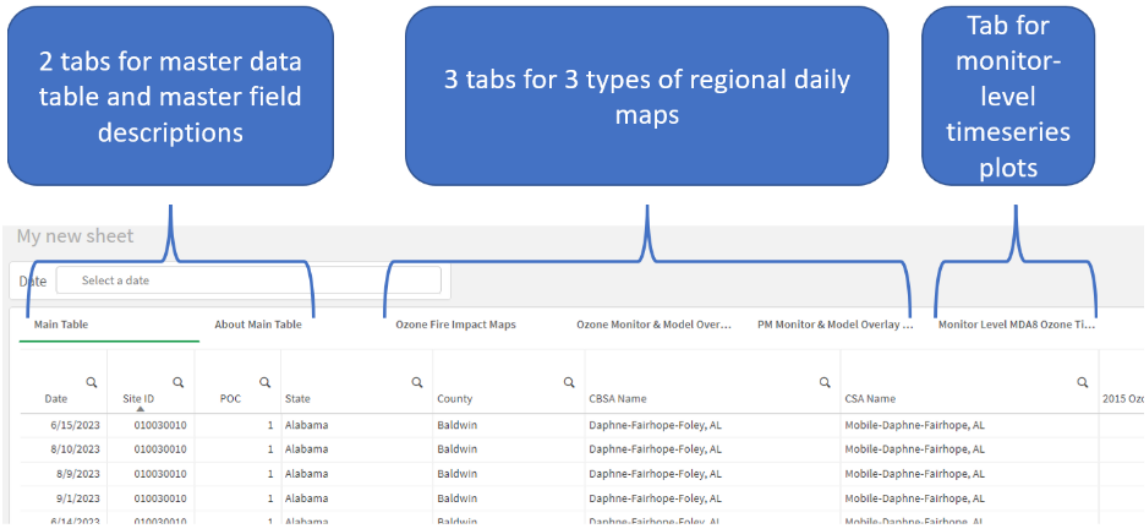
Overview

Outputs from the Expedited Modeling of Burn Events Results (EMBER) dataset are provided through a Qlik website interface. EMBER is a photochemical modeling-based screening dataset for evaluating wildfire impacts on 2023 ozone levels in the United States.

The Qlik Application allows the user to browse the dataset using three mechanisms:

1) A master data table that provides monitor-level daily information
2) Regional daily maps of observations and model results
3) Monitor-level timeseries plots showing daily ozone values from observations and the EMBER modeling

Users can navigate to these three types of information through tabs at the top of the webpage:



Master data table

The Master data table includes the fields described in Table 1.

Table 1. EMBER master data table fields

Field	Description
Date	Date range: Apr 11-Sep 29, 2023
Site Id	AQS monitor ID in format SSCCCMMMM where SS = state FIPS, CCC = county FIPS, MMMM = monitor ID
POC	Parameter occurrence Code. Used to distinguish different instruments that measure the same parameter at the same site.
State	state name
County	county name
CBSA[1] Name	CBSA name
CSA[2] Name	CSA name
2015 nonattainment area	2015 nonattainment area name, if applicable
Monitored MDA8 ozone (ppb)	monitored MDA8 ozone based on ozone values available in AQS as of May 23, 2024. Data truncated to nearest whole number.
Modeled MDA8 ozone (ppb): Base EMBER Simulation	modeled MDA8 ozone from base EMBER simulation for the 36km grid cell in which the monitor is located. Data truncated to nearest whole number.
Modeled MDA8 Ozone Impacts from US and Canada Fires (ppb)	EMBER predictions of MDA8 ozone attributed to US and Canadian wildland and prescribed fire emissions in the 36km grid cell in which the monitor is located[3]. Data rounded to nearest whole number.
Modeled MDA8 Ozone Impacts from Canada Wildfires (ppb)	EMBER predictions of MDA8 ozone attributed to Canadian wildfire emissions in the 36km grid cell in which the monitor is located[4]. Data rounded to nearest whole number.
Modeled MDA8 ozone (ppb): Zero Fires Simulation	modeled MDA8 ozone from EMBER simulation without any emissions from US and Canadian wildland and prescribed fires (i.e. “Zero Fires Simulation”) for the 36km grid cell in which the monitor is located. Data truncated to nearest whole number.
Modeled MDA8 ozone (ppb): Zero Canada Wildfires Simulation	Modeled MDA8 ozone from EMBER simulation without any emissions from Canadian wildfires (i.e. “Zero Canada Wildfires Simulation”) for the 36km grid cell in which the monitor is located. Data truncated to nearest whole number.
Latitude	Latitude of monitor location provided in decimal degrees
Longitude	Longitude of monitor location provided in decimal degrees
Network	Monitoring network name
Monitor Type	Provides information about who runs to monitoring site (i.e. state, federal, industry etc)

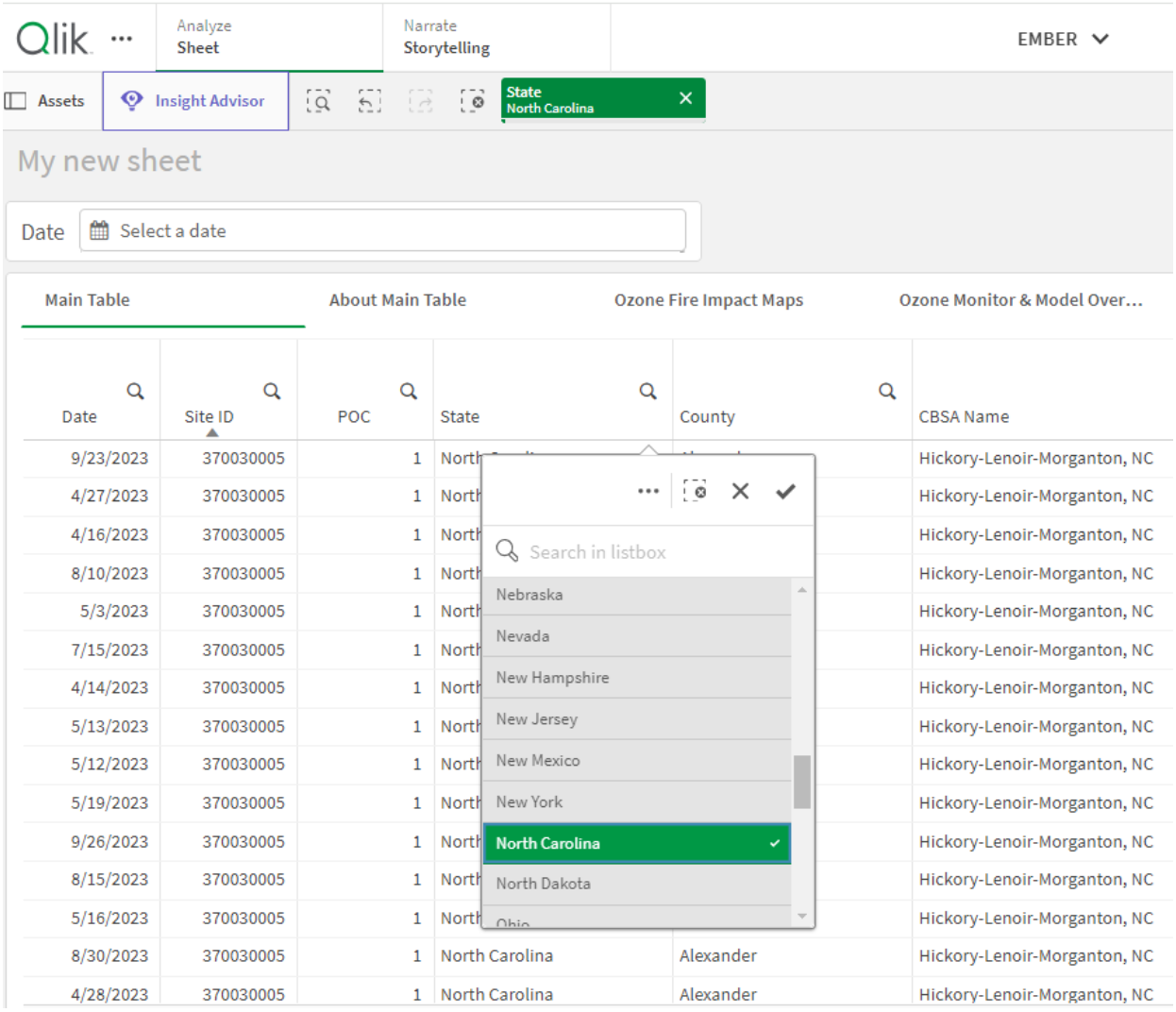
[1] CBSA means Core Based Statistical Area as defined by the US Census Bureau: https://www.census.gov/programs-surveys/metro-micro/about/glossary.html

[2] CSA means Combined Statistical Area as defined by the US Census Bureau: https://www.census.gov/programs-surveys/metro-micro/about/glossary.html

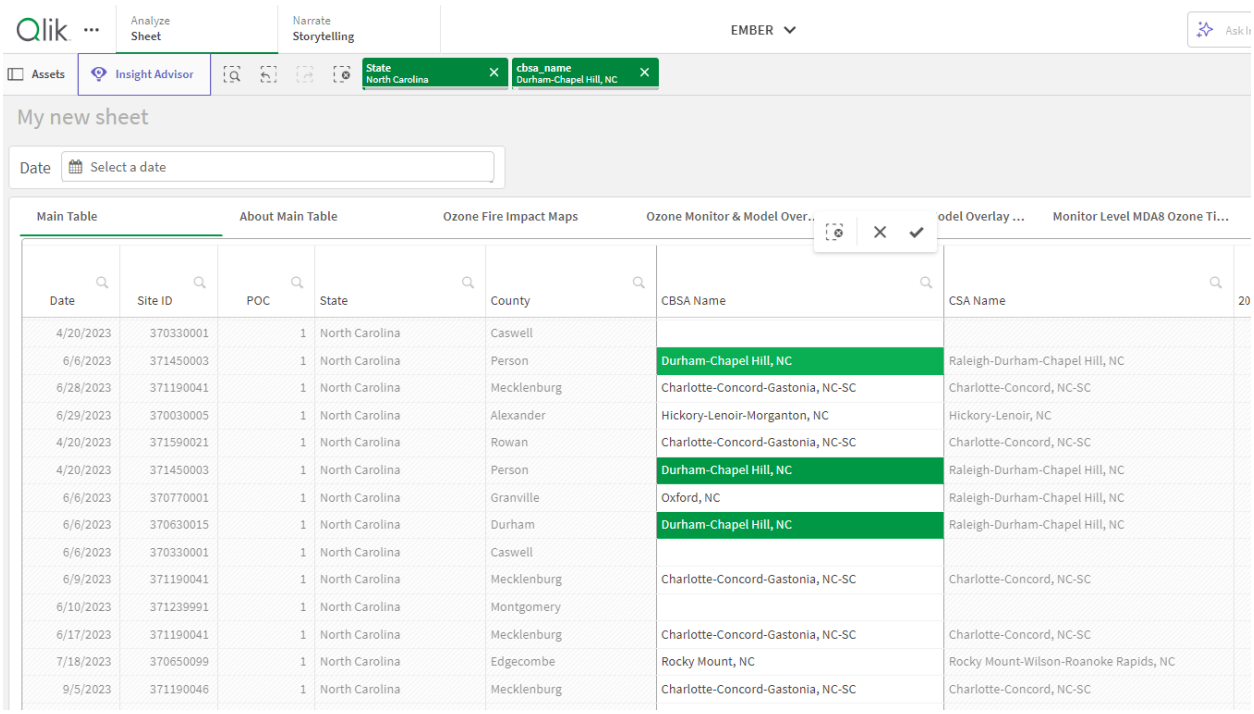
[3] Calculated as [Modeled MDA8 Ozone (ppb): Base EMBER Simulation] – [Modeled MDA8 Ozone (ppb): Zero Fires Simulation]

[4] Calculated as [Modeled MDA8 Ozone (ppb): Base EMBER Simulation] – [Modeled MDA8 Ozone (ppb): Zero Canada Wildfires Simulation]

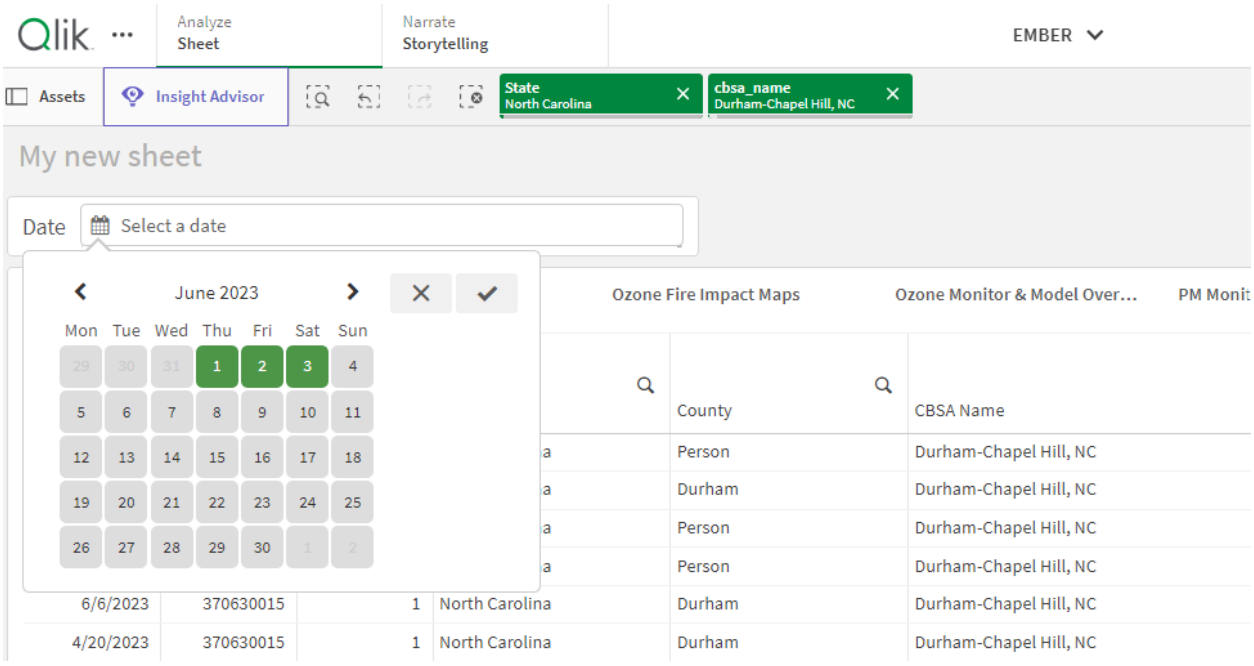
For each field in the master data table, users may filter data by clicking on the magnifying glass associated with that field and selecting the desired values. The image below demonstrates this function for the "State field" with the user choosing to select only data associated with monitors in the state of North Carolina. Once the field value is selected, the user should click the ✔ symbol in the upper right-hand corder of the drop-down box to finish their selection.



Values for each data field can also be selected by clicking the desired value within the table itself and then clicking the ✔ symbol as shown below for the Durham-Chapel Hill, NC CBSA.

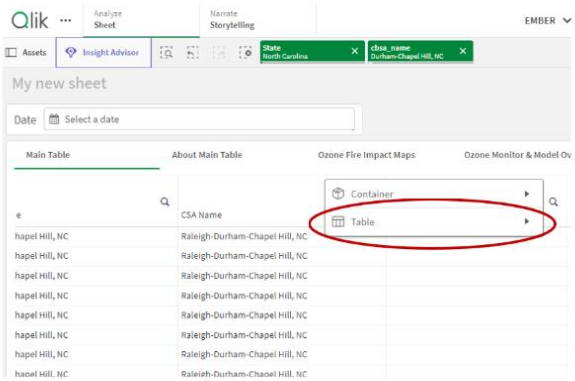


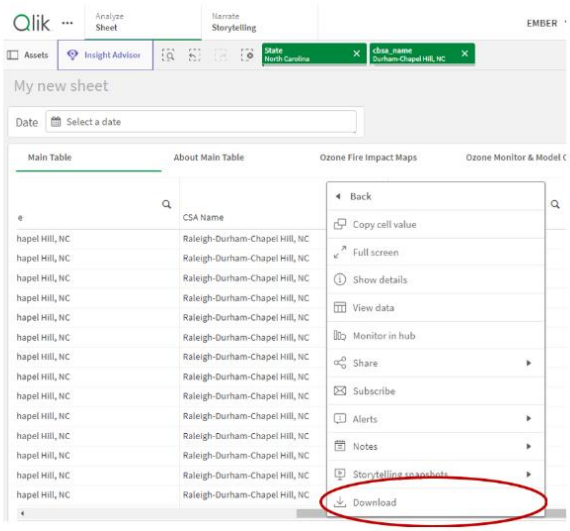
Dates may be selected either by clicking on the magnifying glass for the “Date” field or by clicking on the Calendar as shown below.



Clicking on the field name, will sort that field in ascending or descending order for numerical or date fields and by alphabetical or reverse alphabetical order for character fields.

All selected records from the table can be downloaded as an excel or pdf file by right clicking on any field in the data table, selecting “table” from the drop-down menu and then selecting “download” from the second drop-down menu.

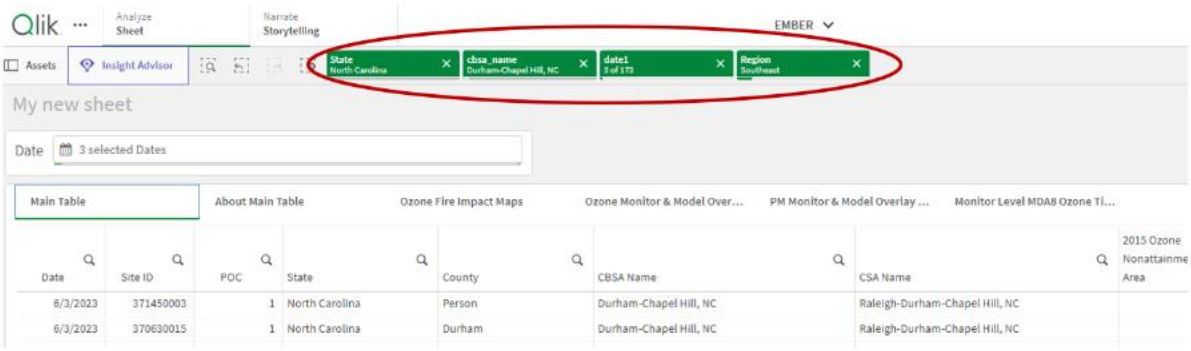


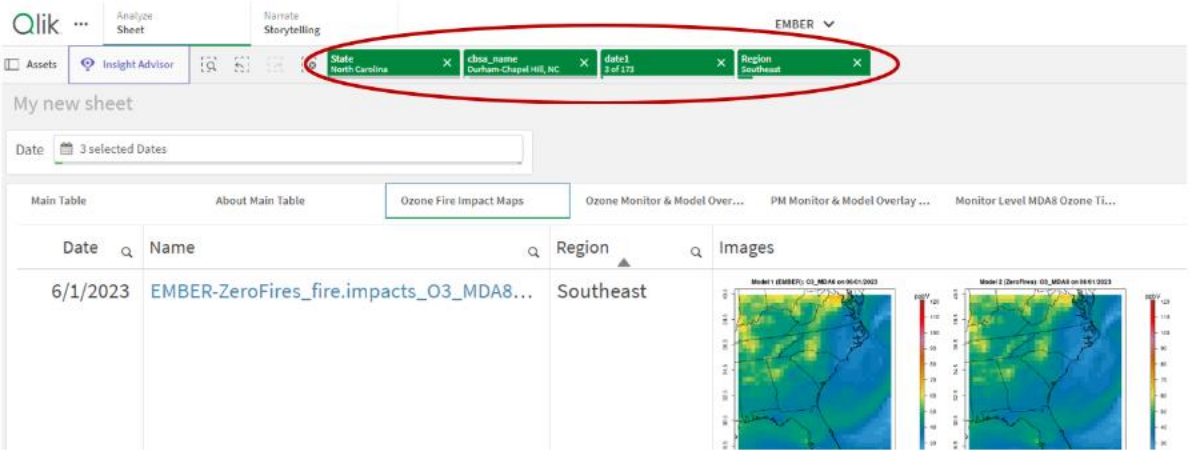


The field names on the table will wrap up to 3 lines but in cases where the width of the field does not provide enough characters for the full name of the field to be visible, field names will appear cut off. To view the full field name, hover the mouse above the field label or increase the width of the field. The user can manually increase or decrease the width of any fields in the main table by dragging right edge of the field.

Clearing selections from any tab

When field values are selected on one tab, they will be carried over to all tabs. Selected values for each field will appear as green boxes at the top of the webpage. The user may clear each selection by clicking on the "x" at the right sides of the green box.



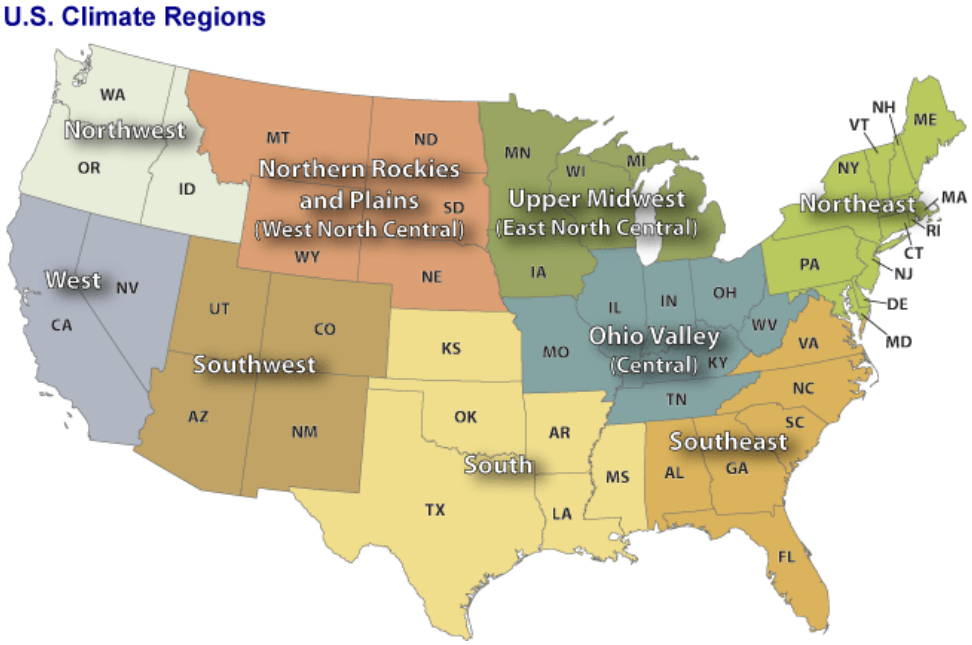


Regional daily maps of observations and model results

There are three types of regional daily maps provided. Each one can be accessed via its own tab.

1. Ozone Fire Impact Maps: These maps have four panels. The top left panel shows gridded EMBER base simulation 8-hr daily maximum (MDA8) ozone concentrations (ppb) on the selected day. The top right shows gridded modeled MDA8 ozone concentrations (ppb) if no fire emissions had occurred during April 11-September 29 2023 throughout US and Canada (i.e. Zero Fires Simulation). The bottom left panel shows the gridded model-predicted fire impacts on MDA8 ozone (ppb) calculated as [Modeled MDA8 Ozone (ppb): Base EMBER Simulation] – [Modeled MDA8 Ozone (ppb): Zero Fires Simulation]. The bottom right panel shows the gridded model-predicted fire impacts on MDA8 ozone as a percentage of the base EMBER MDA8 ozone concentration.
2. Ozone Monitor & Model Overlay Maps: These figures have two panels. The left panel shows both gridded EMBER base MDA8 ozone (ppb) and observed MDA8 ozone concentrations at monitor locations on the selected day. The right panel shows the difference between EMBER base MDA8 ozone and observed MDA8 ozone at monitor locations in ppb.
3. PM Monitor & Model Overlay Maps: These figures have two panels. The left panel shows both gridded EMBER base 24-hr $PM_{2.5}$ ($\mu g/m^3$) and observed 24-hr $PM_{2.5}$ concentrations at monitor locations on the selected day. The right panel shows the difference between EMBER base 24-hr $PM_{2.5}$ ($\mu g/m^3$) and observed 24-hr $PM_{2.5}$ ($\mu g/m^3$) at monitor locations.

The configuration is the same across the three regional daily maps tabs. For each tab, there are individual maps available for each day from April 11-September 29, 2023. Maps are provided for 9 different US regions based on the NOAA climate regions.[5] These climate regions are shown in the figure below.



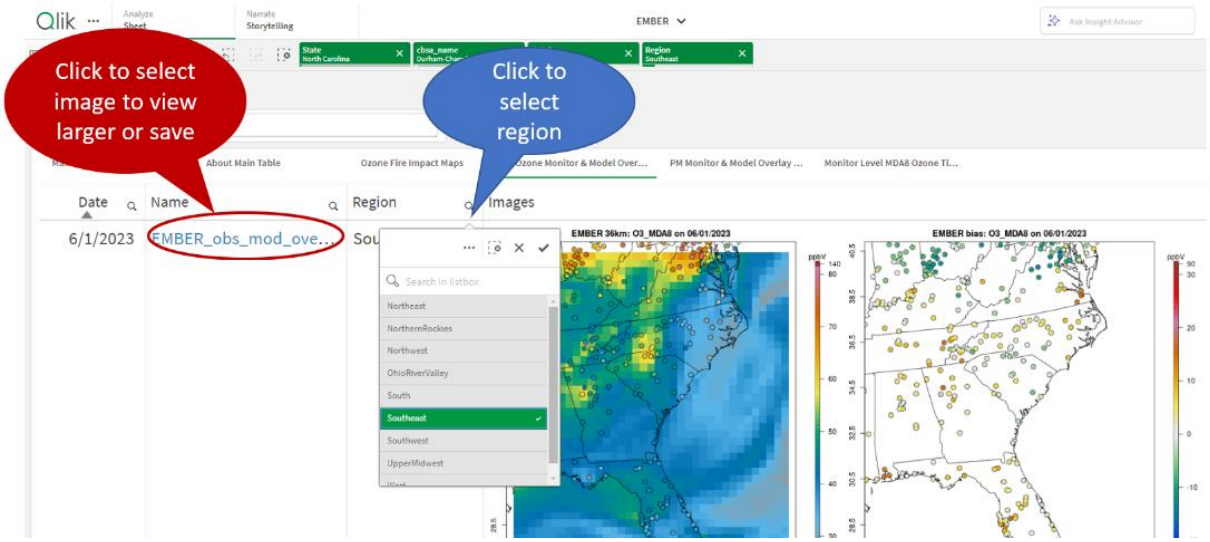
[5] https://www.ncei.noaa.gov/access/monitoring/reference-maps/us-climate-regions based on Thomas R. Karl and Walter James Koss, 1984: "Regional and National Monthly, Seasonal, and Annual Temperature Weighted by Area, 1895-1983." Historical Climatology Series 4-3, National Climatic Data Center, Asheville, NC, 38 pp.

Dates can be selected by clicking on the calendar as was described for the master data table. Once dates are selected, only maps for those dates will be shown. Dates selected from other tabs will remain selected for the maps unless those selections are cleared.

Regions can be selected by clicking on the magnifying glass next to the region field as shown below. If a region has been selected under any one of the regional daily map tabs, that region will stay selected on all tabs unless the selection is cleared.

Maps for all selected days and regions will appear in the images field. The user may need to scroll down to view all maps if multiple days or regions are selected. The user can click on the link associated with each map in the "Name" field in order to see a larger image or to the save image file by right clicking on the enlarged image.

The user can manually increase or decrease the size of the "Date", "Name", "Region" and "Image" fields by dragging right-hand side of the field. This will provide the user a better view of the fields of most interest depending on their monitor size and resolution.

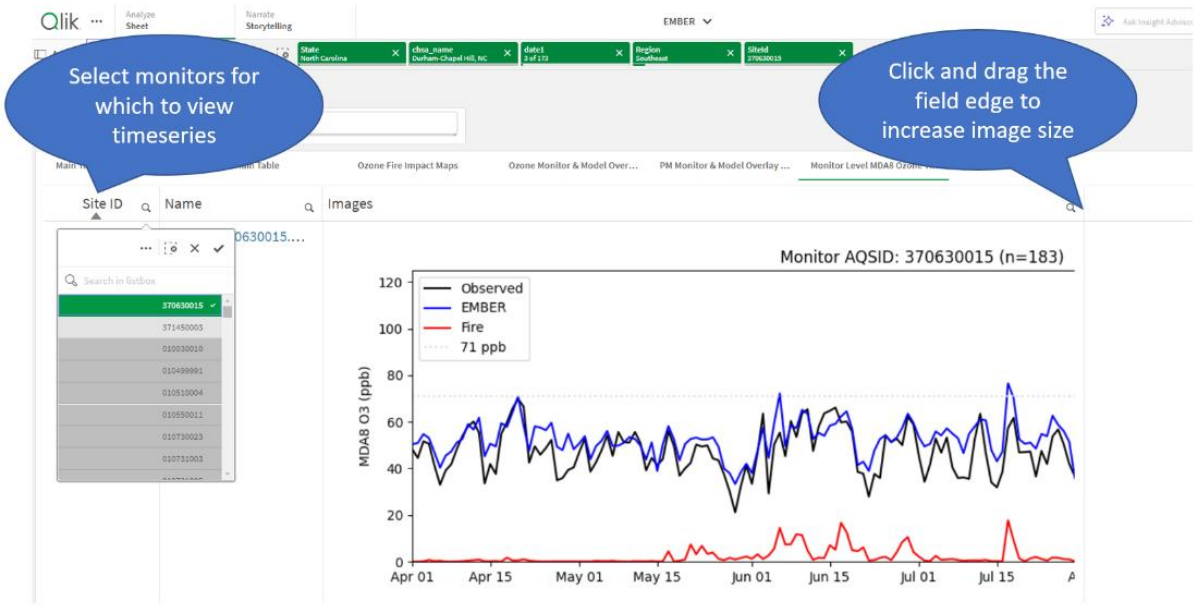


Monitor-level timeseries plots

Monitor-level timeseries plots include three lines. In black is the observed MDA8 ozone concentrations at the monitor location. In blue is the EMBER base simulation MDA8 ozone concentration in the model grid-cell containing the monitor. In red is the EMBER predictions of fire impacts on MDA8 ozone in the model grid-cell containing the monitor calculated as [Modeled MDA8 Ozone (ppb): Base EMBER Simulation] – [Modeled MDA8 Ozone (ppb): Zero Fires Simulation]. Values are only shown on days with reported monitor readings for MDA8. There is a dashed horizontal line at 71 ppb to indicate the value where MDA8 ozone is exceeding the NAAQS.

There is a timeseries plot available for every contiguous US monitor location with data in AQS during the model simulation time period. Selections made for in the main data table for state, county, CBSA, CSA and nonattainment area will carry over to this tab such that only monitors within those selected regions will appear unless those selections are cleared. A subset of monitors may be selected by clicking on the magnifying glass for the Site ID field as shown below.

The default width of the image field for this tab is narrow. The user can manually increase the size of the image by dragging the right side of the field.



The user can click on the link associated with each timeseries in the “Name” field to see a larger image or to the save image file by right clicking on the enlarged image.