ClimateSERV Module 1

Getting Started with ClimateSERV

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Prerequisites & Requirements

All you will need for this module is a computer and access to the internet. No prerequisites are necessary!

Learning Objectives

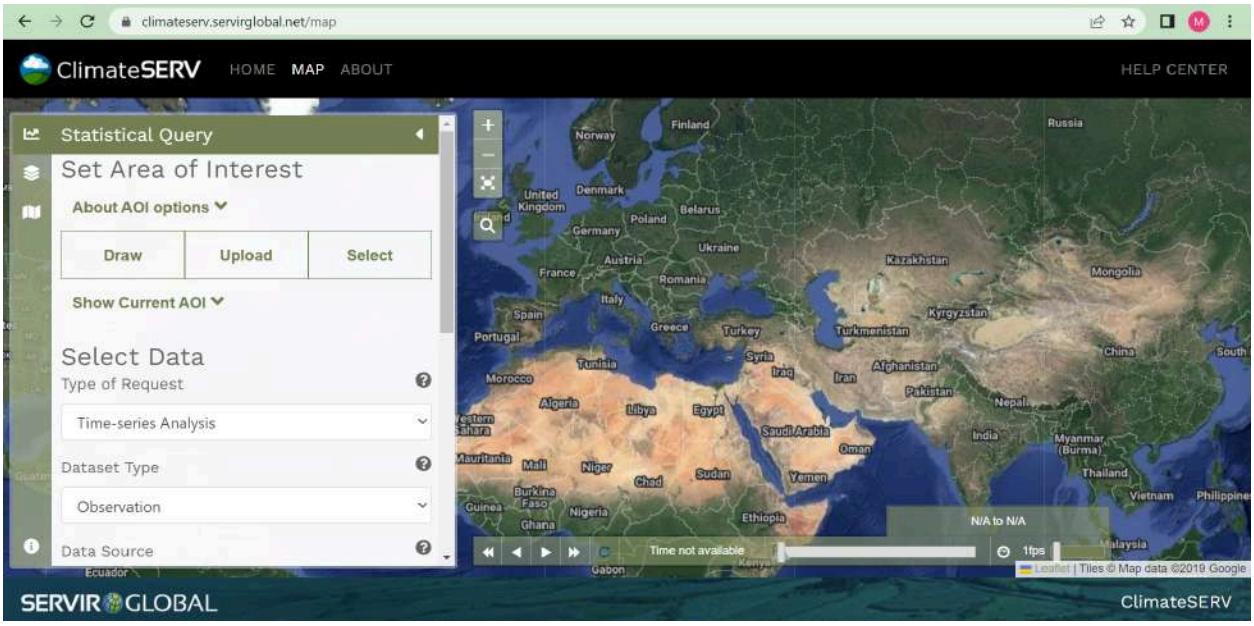
By the end of this module you will be able to...

- Interact with ClimateSERV's Statistical Query Panel to visualize how various datasets change over time in a region of interest
- Interact with ClimateSERV's Statistical Query Panel to download geospatial data from ClimateSERV
- Interact with ClimateSERV's Layers Panel to visualize how data varies spatially
- Modify data visualization parameters within ClimateSERV's Layers Panel
- Interact with ClimateSERV's Basemaps Panel to alter the basemap used to display geospatial data

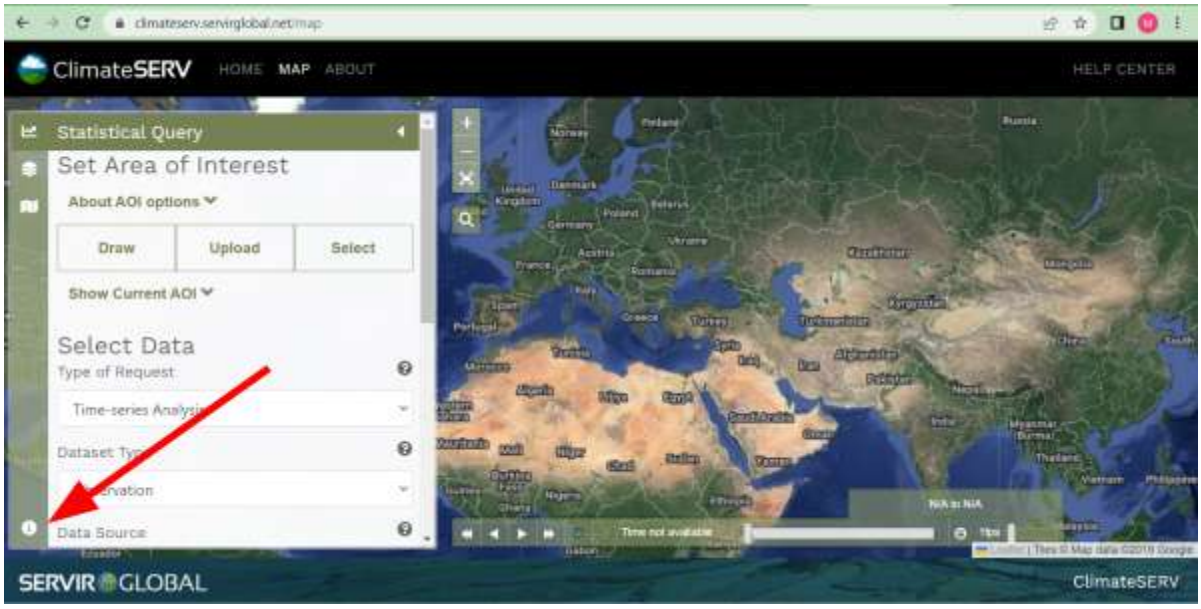
Welcome to ClimateSERV

ClimateSERV is a free and open source website that enables scientists, development practitioners, decision-makers, and students to easily visualize and download atmospheric and biophysical datasets. To get started in ClimateSERV, navigate to the ClimateSERV map page by clicking here. If this doesn't work, navigate to the ClimateSERV homepage, then click the green button that says **"Get Started"**.

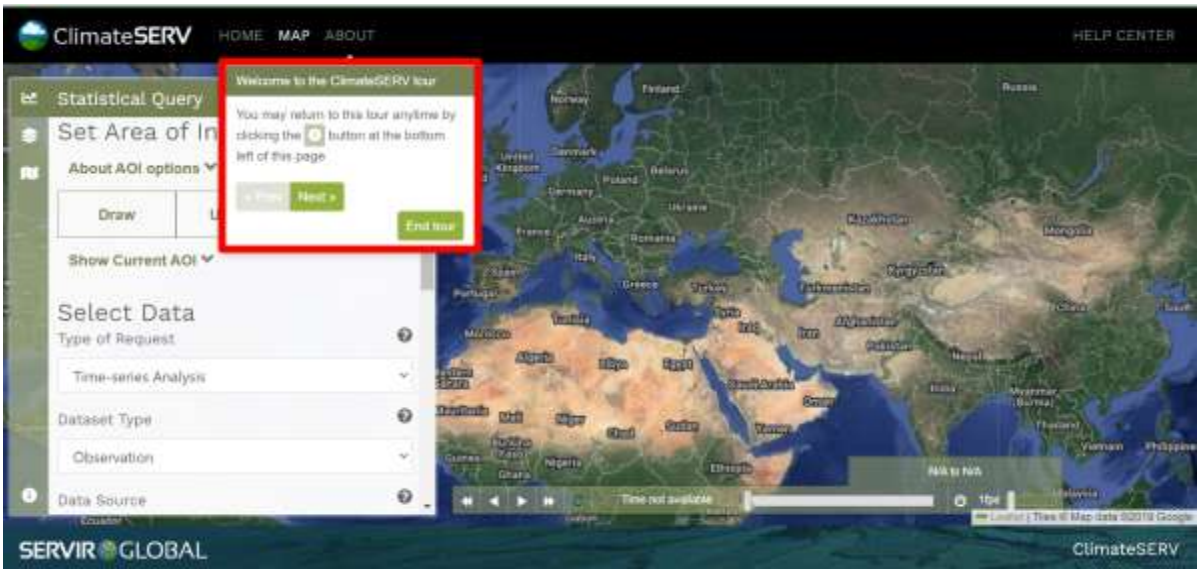
You should now be on the ClimateSERV map page. If your screen appears like the one shown below, you are in the right place!



If this is your first time visiting ClimateSERV, you should see a popup that says **"Welcome to the ClimateSERV tour"**. This popup should appear towards the top left of the page, and is shown in the image below. If you do not see this popup, click the white **"i"** icon towards the bottom left of the page and the tour will appear. You can return to this tour at any time by clicking the **"i"** icon (shown in the image below by the arrow).



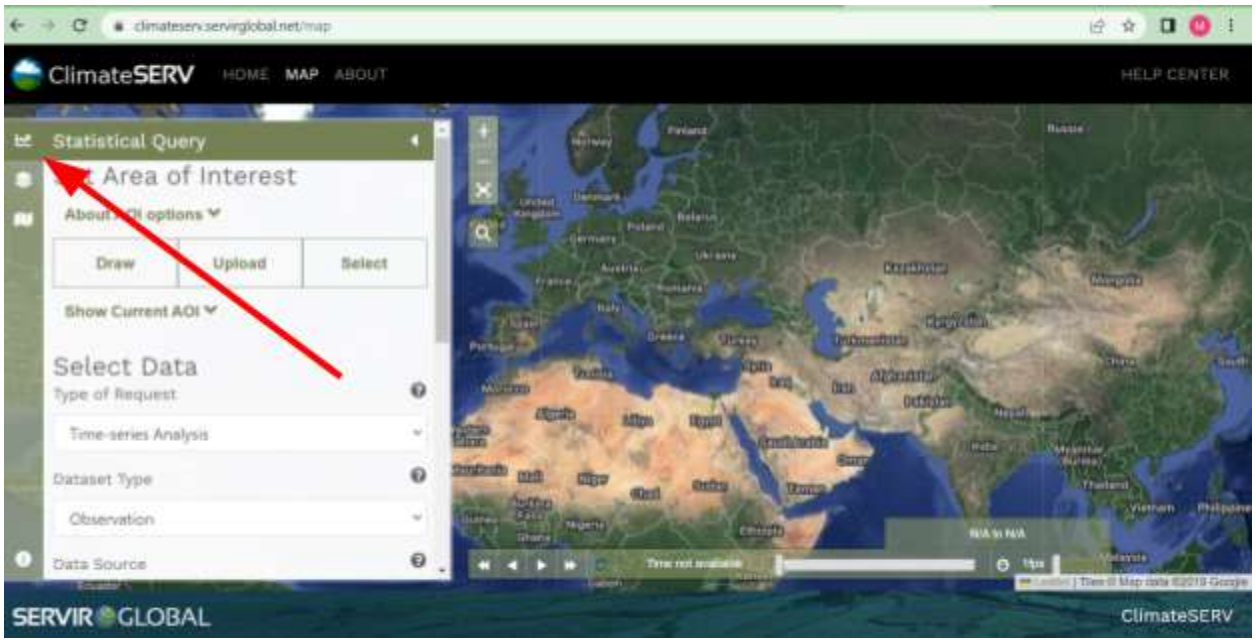
Navigate through the tour by clicking the green **"Next"** button (located in the red box below). The tour will introduce you to the three different methods we can use to interact with data in ClimateSERV: the statistical query, layers, and basemaps panels. After navigating through the tour, click the green **"End tour"** button.



Navigate through ClimateSERV's map by clicking and dragging on the map to move around. You can scroll to zoom in and out.

Chapter 1: Statistical Query Panel

To navigate to the Statistical Query Panel in ClimateSERV, click the icon in the top left showing a graph (indicated by the arrow in the image below). Clicking this icon will expand or hide the Statistical Query menu. The Statistical Query Panel is useful for investigating how data varies over time for a specific area of interest.

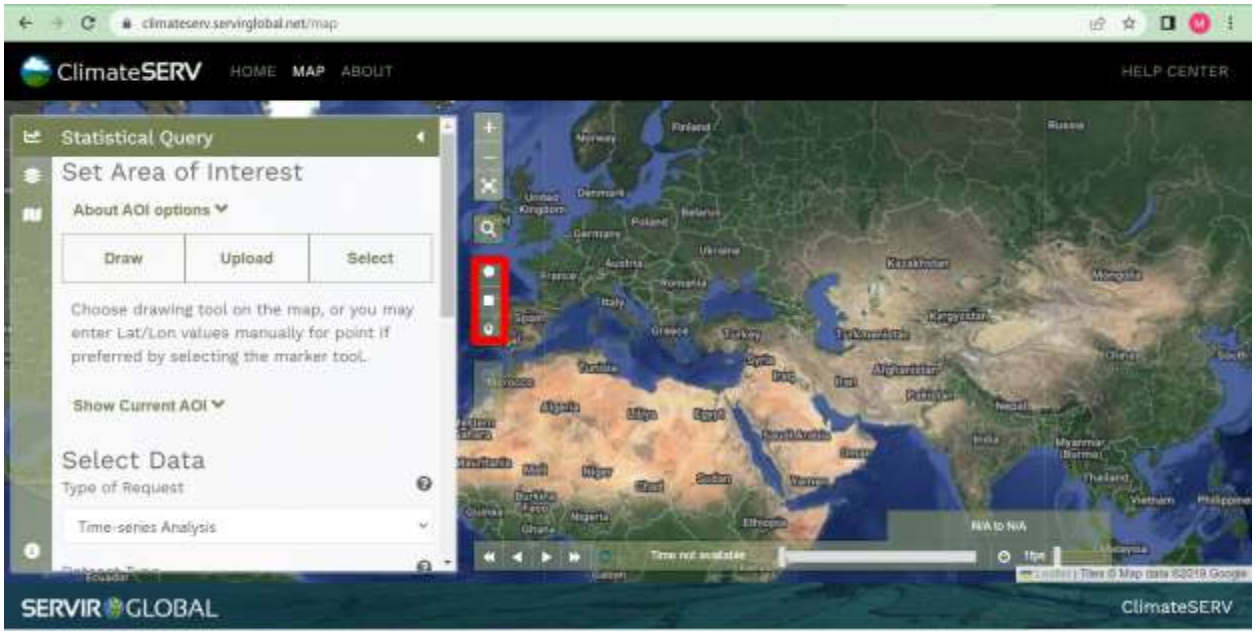


Step 1: Setting Our Area of Interest

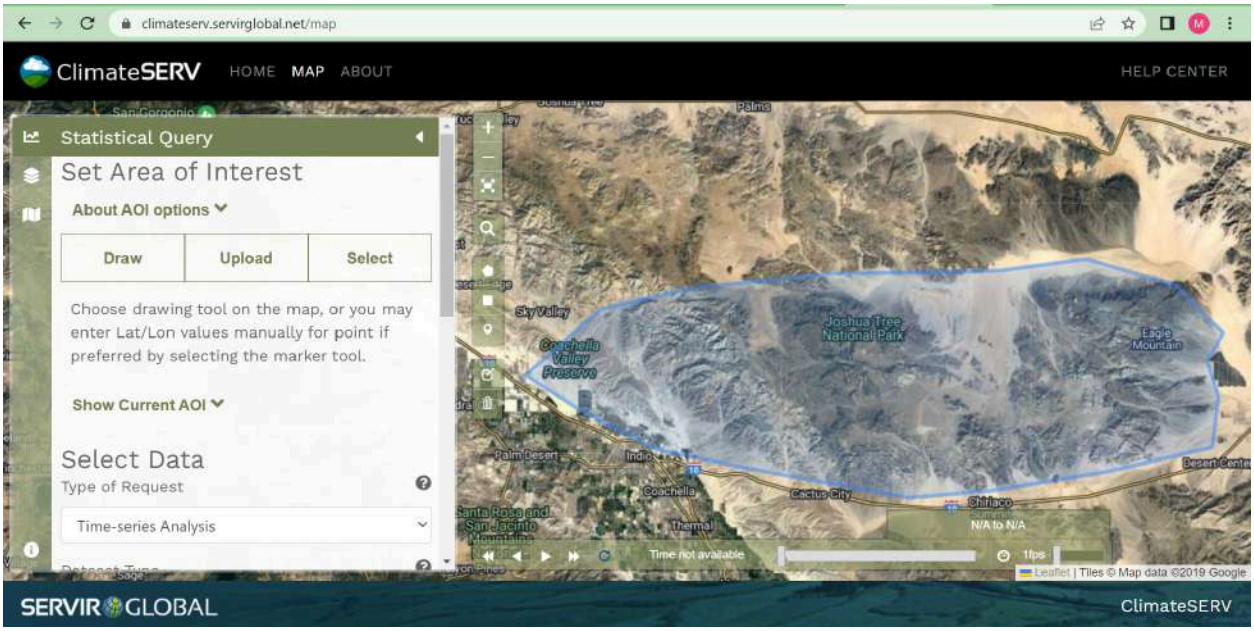
To interact with the Statistical Query Panel, we must first set our area of interest. We have three options to do so: **“Draw”**, **“Upload”**, and **“Select”**. You can learn more about each option by clicking **“About AOI options”**.

A. Draw Mode

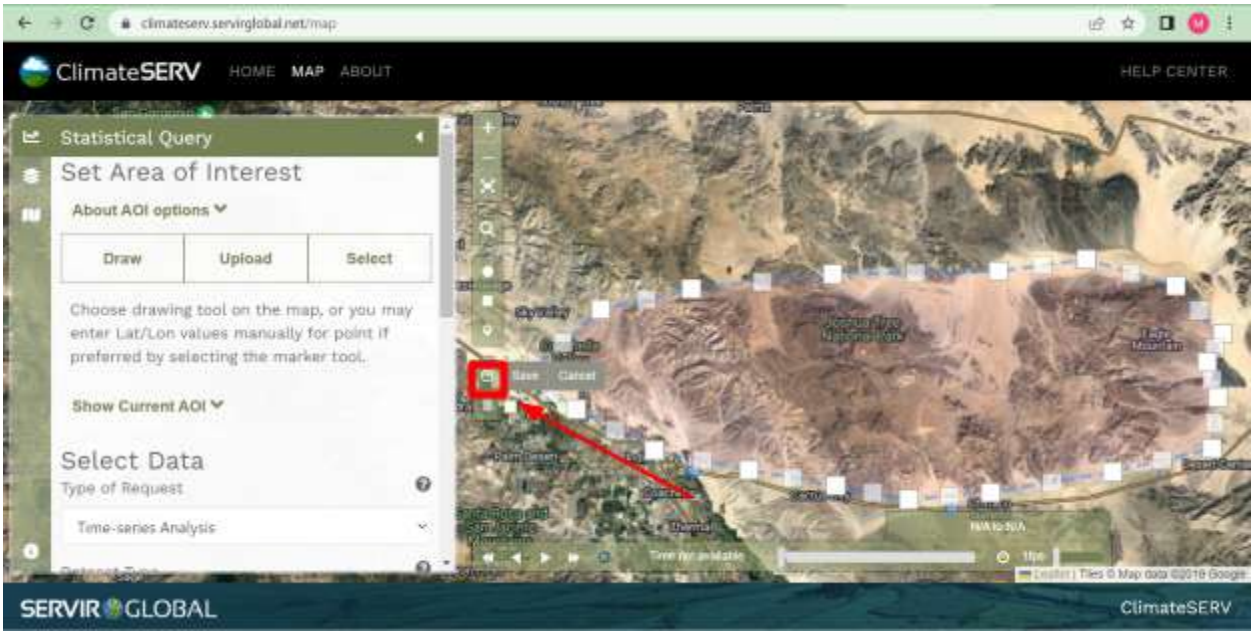
Click the **“Draw”** button under the text that says **“Set Area of Interest”**. This will bring up three extra icons on the left side of the map, which are located in the red rectangle in the image below. These icons allow us to create a polygon, rectangles, or a point to define our area of interest. Click one of these icons and draw on the map to select an area of interest (scroll to zoom in or out).



You can see an example of an area of interest in the image below. This area was drawn around Joshua Tree National Park in the United States using the polygon tool (which is represented by a pentagon).



You can edit any of the points in a user-drawn polygon by clicking the editing tool, which is located in the red square in the screenshot below. After clicking this tool, your points will appear as squares, whose location can be changed by dragging. Then, click the **"Save"** button (located just to the right of the editing tool) to save any changes you have made.

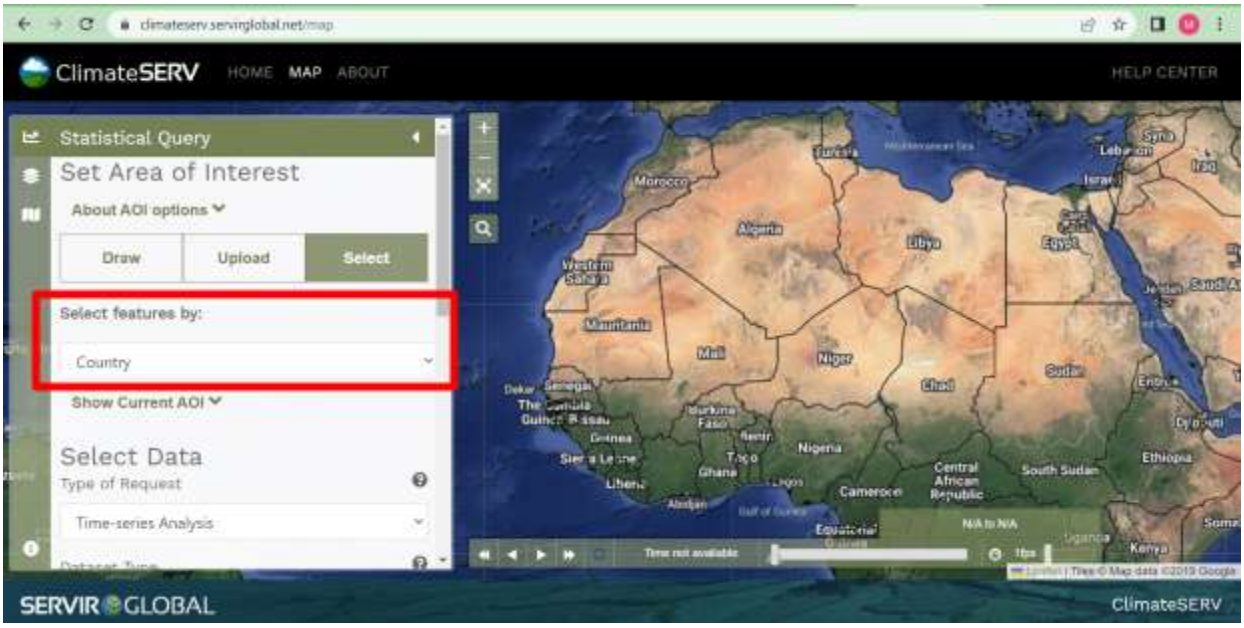


B. Upload Mode

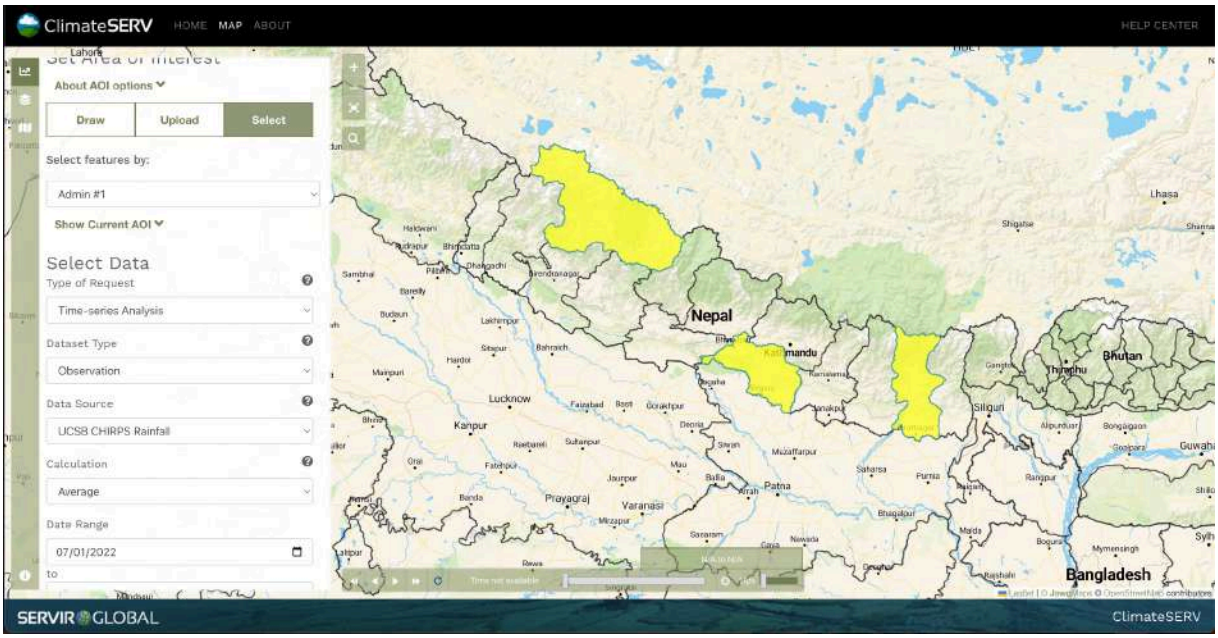
Clicking the **"Upload"** button under the text will allow you to upload a JSON, GeoJSON, or zipped shapefile as your area of interest. If you are uploading a GeoJSON, the latitude and longitude coordinates must be expressed in decimal degrees. [Click here to read an article from TerraMonitor about various geospatial file formats.]

C. Select Mode

Clicking the **"Select"** button under the text that says **"Set Area of Interest"** will allow you to select a country or a more specific administrative boundary as your area of interest. You can select your area of interest by clicking **"Country"**, **"Admin #1"**, or **"Admin #2"**, from the dropdown menu (highlighted in red in the image below).



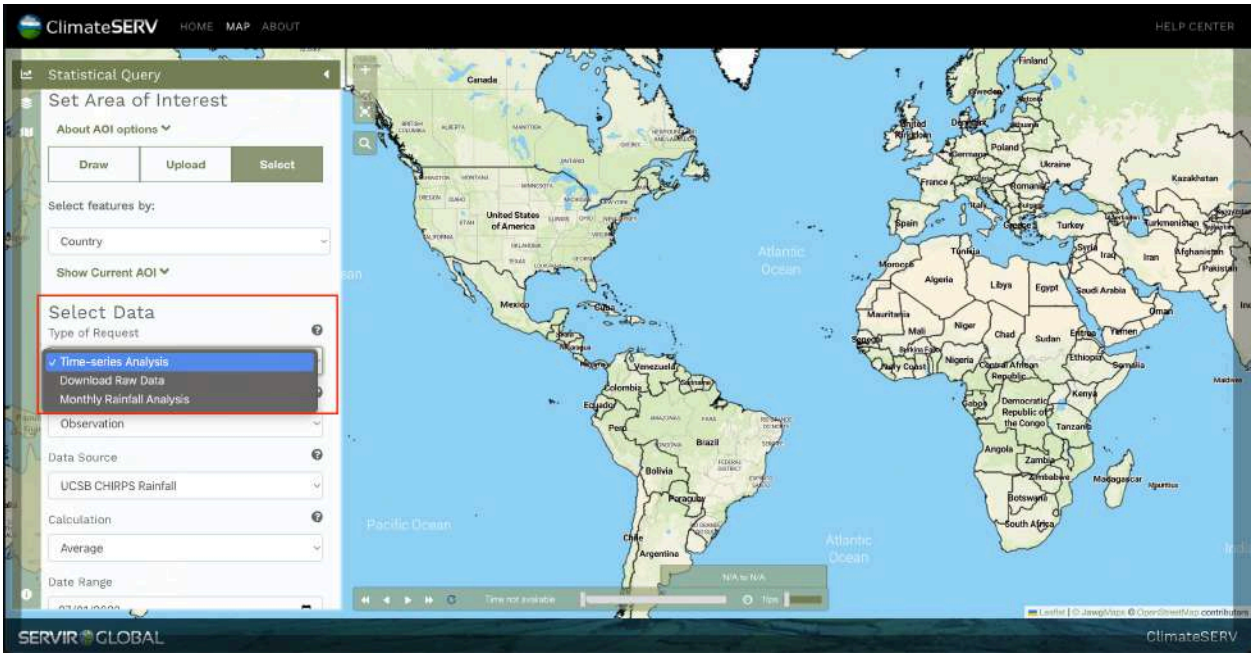
Depending on your selection, the administrative boundaries will be displayed on the ClimateSERV map outline with a black border, also shown in the picture above. You can see that “Admin #1” has a larger area than “Admin #2”. Clicking a specific province/district will highlight that province/district in yellow, and will tell ClimateSERV that you would like to query data from this region. You can select multiple districts at one time, as shown in the image below.



For this exercise, click “Select”. The “Select” button will now be highlighted green. Then, open the dropdown menu by clicking under the text that says “Select features by:” and click “Admin #1”. Now zoom into a location of your choice, and click on at least one province. The provinces you have selected will be highlighted in yellow. Now that you have an area of interest, you are ready to proceed to Step 2 on the next page!

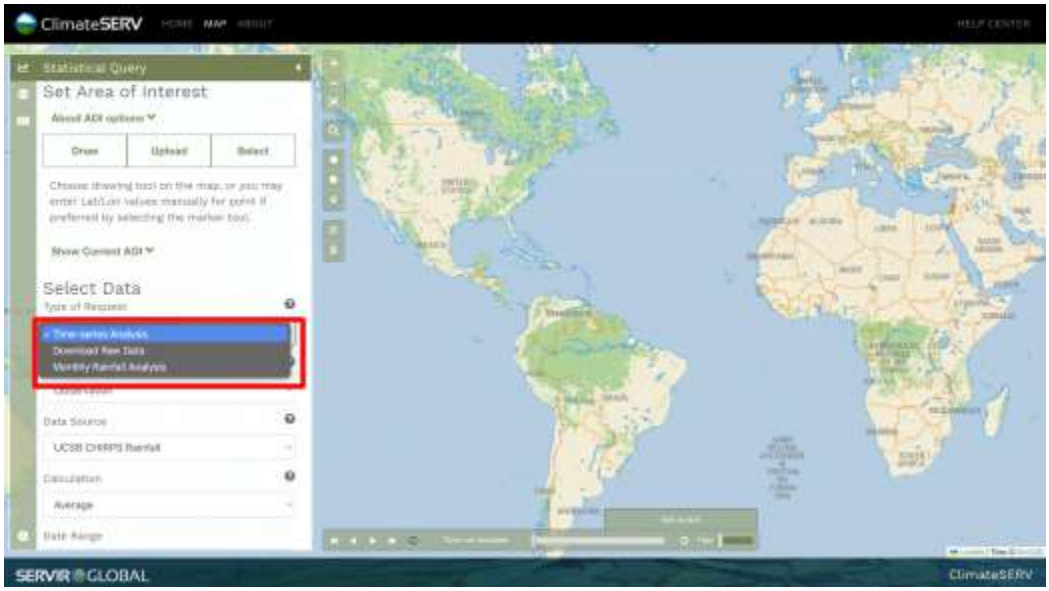
Step 2: Selecting & Visualizing Data

After selecting an area of interest, it's time to select a dataset! Our next step is to decide what type of request we are interested in obtaining from ClimateSERV. Open the dropdown menu by clicking under the text that says **"Type of Request"** to display your options for the type of data request. We can select from the following modes: Time-series Analysis, Download Raw Data, or Monthly Rainfall Analysis Mode. Let's walk through each of these modes one by one.

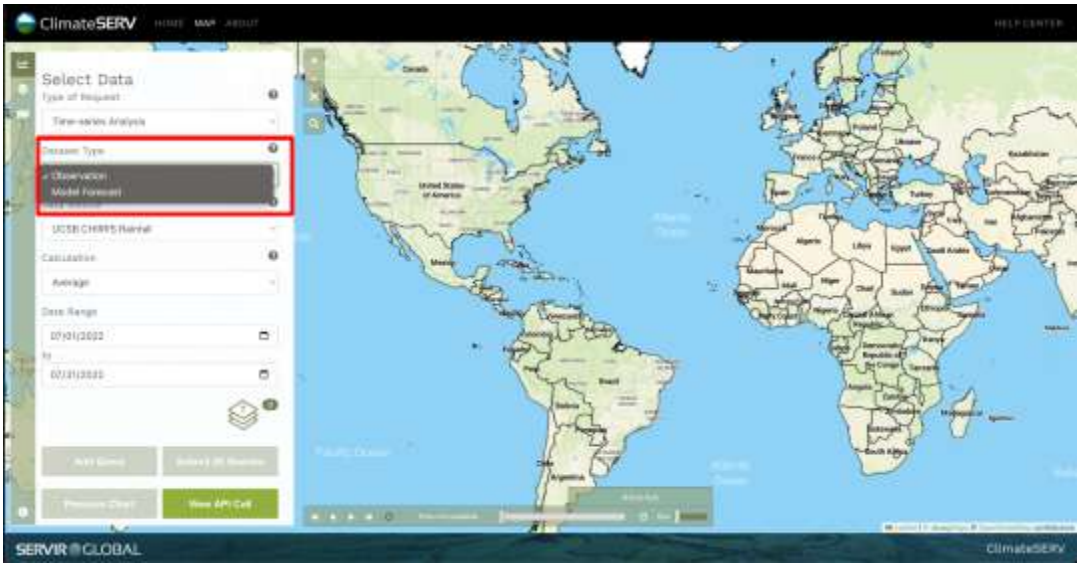


A. Time-series Analysis Mode

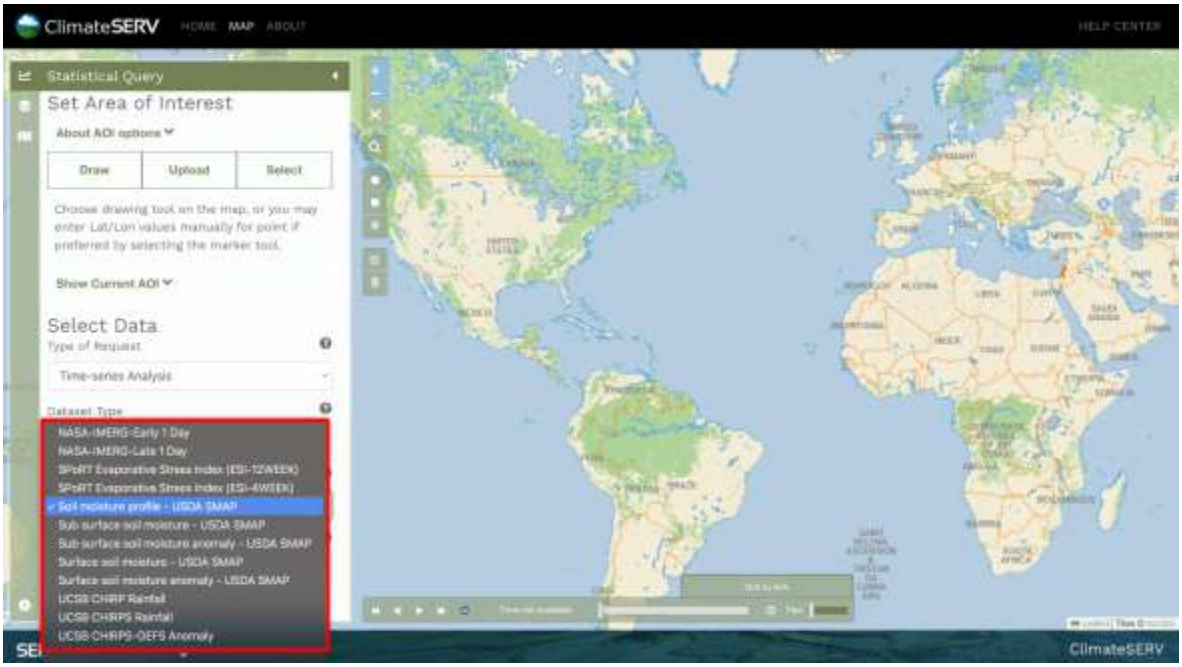
In Time-series Analysis Mode, ClimateSERV will display a graph of data for our selected dataset for a region and time period of interest. To enter Time-series Analysis Mode, click the drop down menu below the text that says **“Type of Request”**, then click **“Time-series Analysis”** as shown in the screenshot below.



ClimateSERV offers the ability to analyze both historical data as well as future forecasts based on climate models. Our first step is to select whether we would like to view an observation or forecast dataset from the dropdown menu under the text that says **“Dataset Type”**. If you would like to view a historical dataset, click **“Observation”**. If you would like to view a future model forecast, click **“Model Forecast”**. For this exercise, click **“Observation”**.



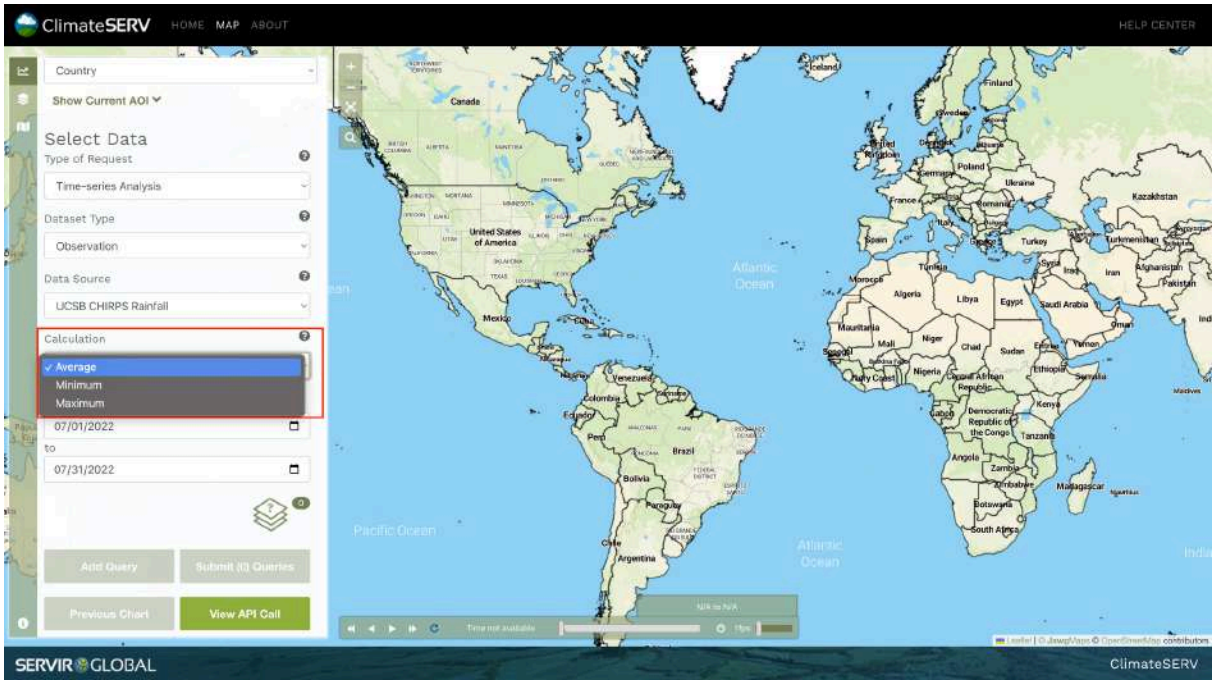
Now we will select the data that we want to visualize in ClimateSERV. Click the dropdown menu under the text that says **"Data Source"** (shown in the screenshot below), then click a dataset. To view the characteristics of each dataset, see the ClimateSERV Dataset Encyclopedia. Click here to view the ClimateSERV Dataset Encyclopedia. **For this exercise, click "Soil moisture profile – USDA SMAP"**.



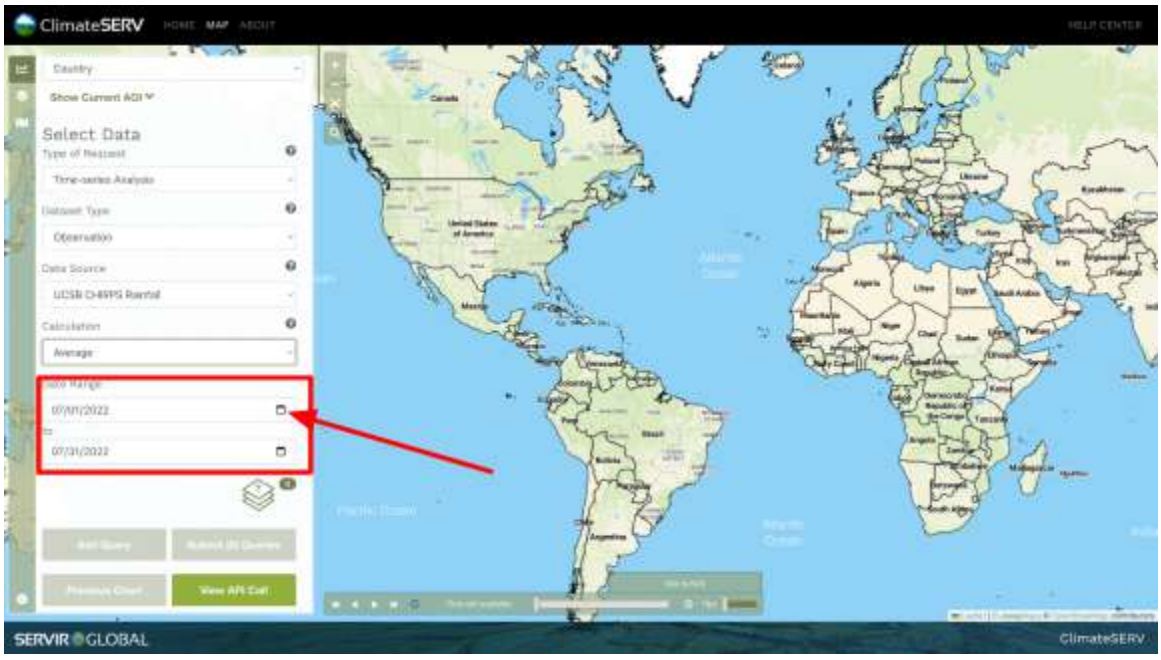
Now we will decide how we want ClimateSERV to aggregate the data within our area of interest. Because these datasets collect data pixel by pixel, the calculation setting determines how we will condense the data for each pixel within the region into one value. This is necessary because in time-series analysis mode, we are asking ClimateSERV to display one data point for each date. Under the text that says **"Calculation"**, open the dropdown menu and click on one of the options (indicated by the red box in the screenshot below).

a. If we click **"average"**, ClimateSERV will average the value from each of the pixels that fall within our study area.
b. If we select **"minimum"**, ClimateSERV will use the minimum value from all of the pixels that fall within our study area.
c. If we select **"maximum"**, ClimateSERV will use the maximum value from all of the pixels that fall within our study area.

For this exercise, click **"Average"**.



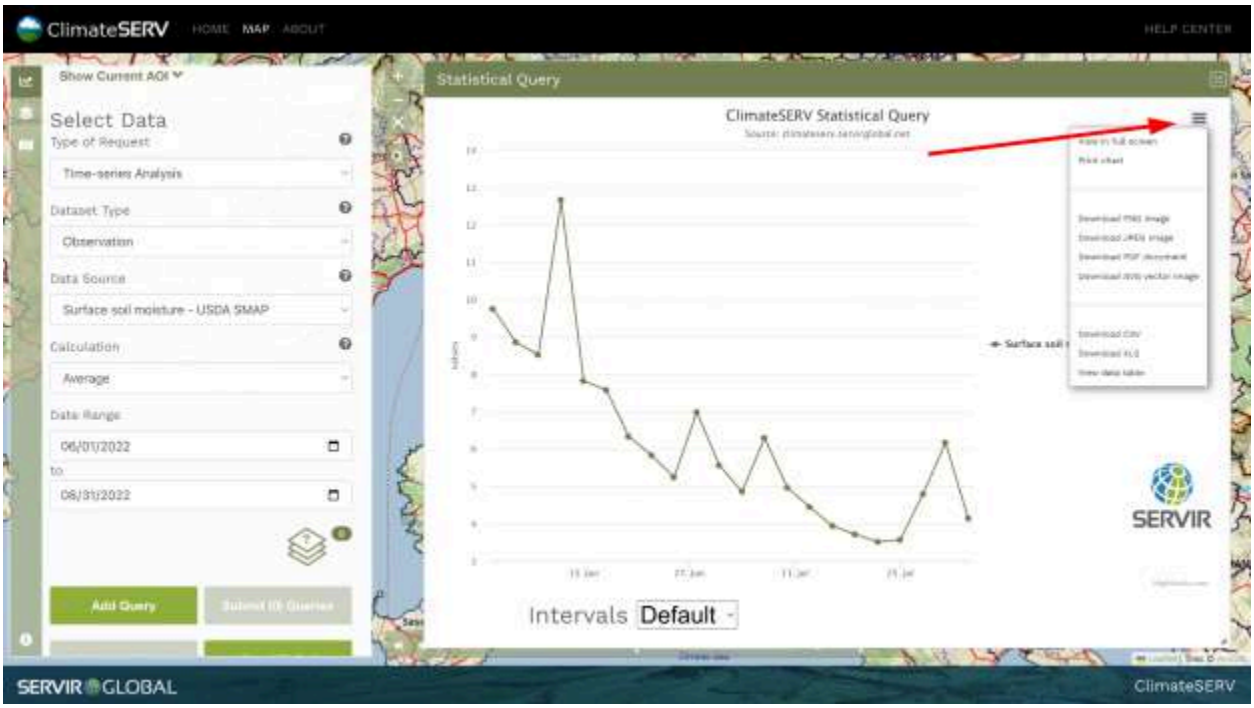
Finally, we must select the start and end dates for which you would like to visualize your data. [Click here to visit the ClimateSERV Dataset Encyclopedia](#)to determine the dates for which your dataset is available. Since the USDA SMAP dataset is available from March 1 of 2015 to present day (with a latency of about a month), you can select any dates within this range. Under the text that says **"Date Range"**, click the calendar icon (indicated by the arrow in the screenshot below) to change the start and end date.



Now that we have selected our dataset, region, and time period of interest, we are ready to visualize the data! To do this. Click the green **“Add Query”** button, as shown in the screenshot below.

Then, click the **“Submit ___ Query(ies)”** button to the right of the **“Add Query”** button. After you click this button, ClimateSERV will display a graph of your data, similar to the graph shown below. You can hover over the line to see the precise values and the date each data value was obtained.

You can download this graph to your device by clicking the icon in the upper right corner of the display window (shown by the arrow in the image below). You can then download the data as a .csv, .xls, or download the figure itself by clicking one of the options from the menu.



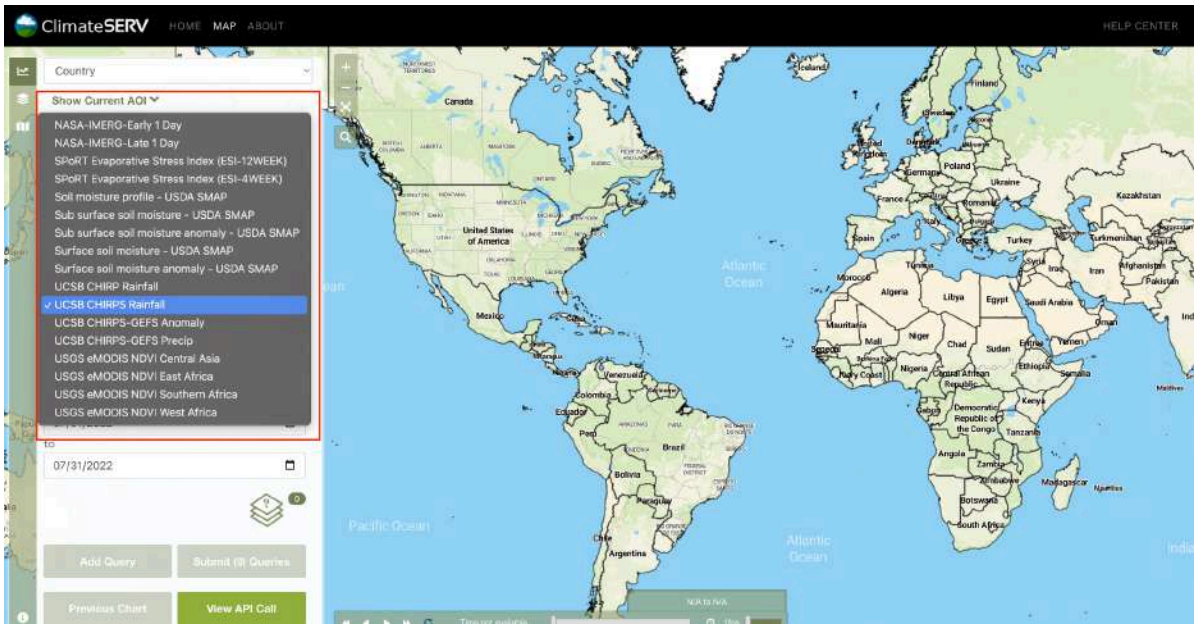
If you want to visualize two datasets or two calculation types at the same time, select your area of interest, type of request, dataset type, dataset source, calculation, and date range for your first dataset of interest. Then Click **"Add Query". Then**, select your area of interest, type of request, dataset type, dataset source, calculation, and date range for your second dataset. Next, click **"Add Query"** again. Finally, click the button that says **"Submit (2) Queries".** ClimateSERV will then display both datasets you queried on the same graph, similar to the image below, which shows the same dataset over the same area of interest, but using two different calculation types (Maximum vs. Average).

B. Download Raw Data Mode

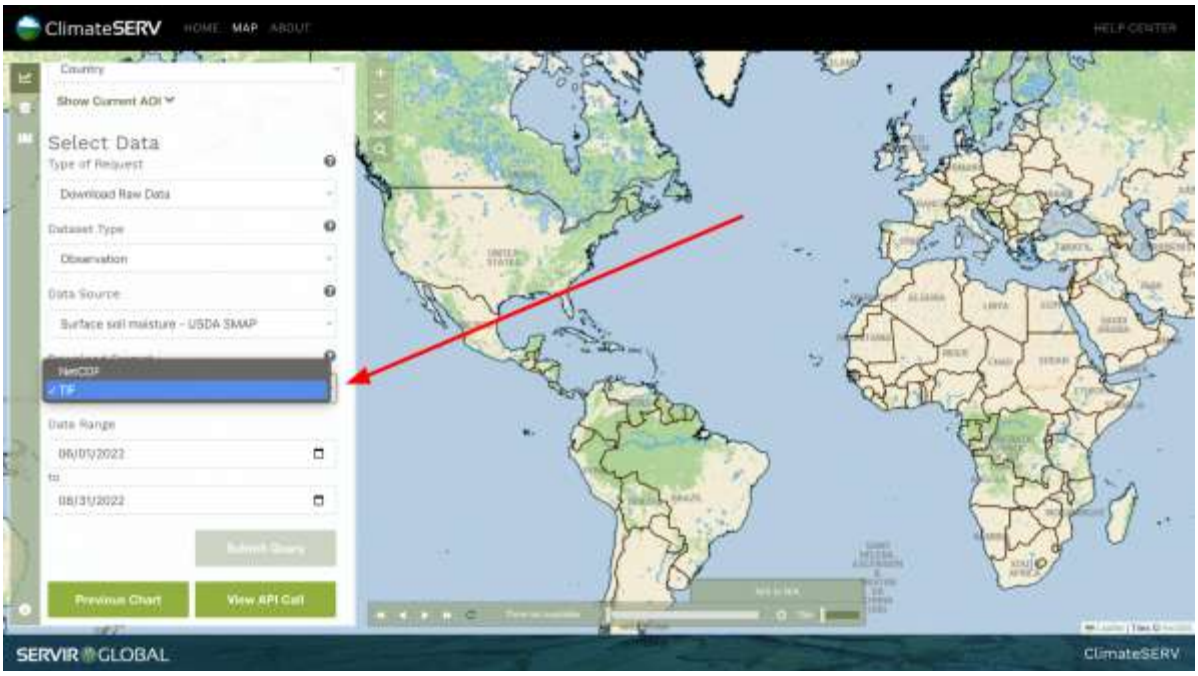
For this type of data request, ClimateSERV will allow you to download the raw data to investigate both the temporal and spatial variation of your data. Under the text that says **“Type of Request”**, open the dropdown menu and click **“Download Raw Data”** as shown in the screenshot below.

Our first step is to select whether we would like to view an observation or forecast dataset. ClimateSERV offers the ability to analyze both historical data as well as future forecasts based on climate models. If you would like to view a historical dataset, click **“Observation”** under the text that says **“Dataset Type”**. If you would like to view a future model forecast, click **“Model Forecast”**. For this exercise, click **“Observation”**.

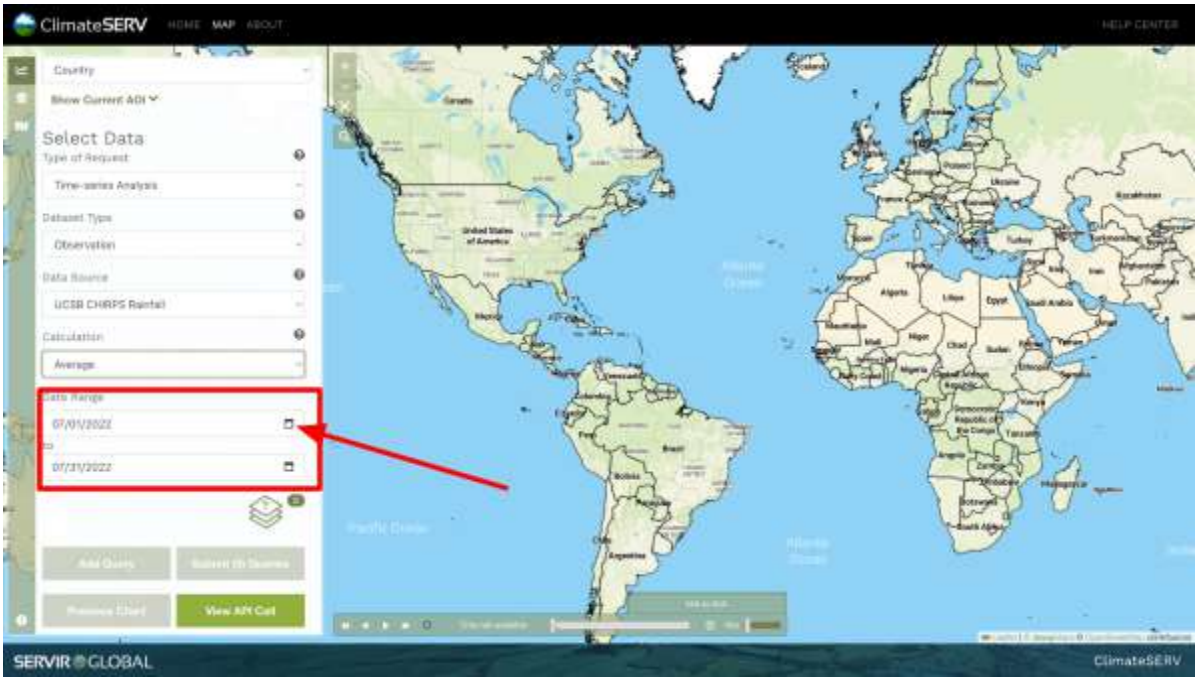
Now we will select the dataset that ClimateSERV will display. Click the dropdown menu under the text that says **“Data Source”** (see the image below), then click a dataset to select the one you are interested in analyzing. To view the characteristics of each dataset, see the ClimateSERV Dataset Encyclopedia. Click here to view the ClimateSERV Dataset Encyclopedia. For this exercise, click **“UCSB CHIRPS Rainfall”**.



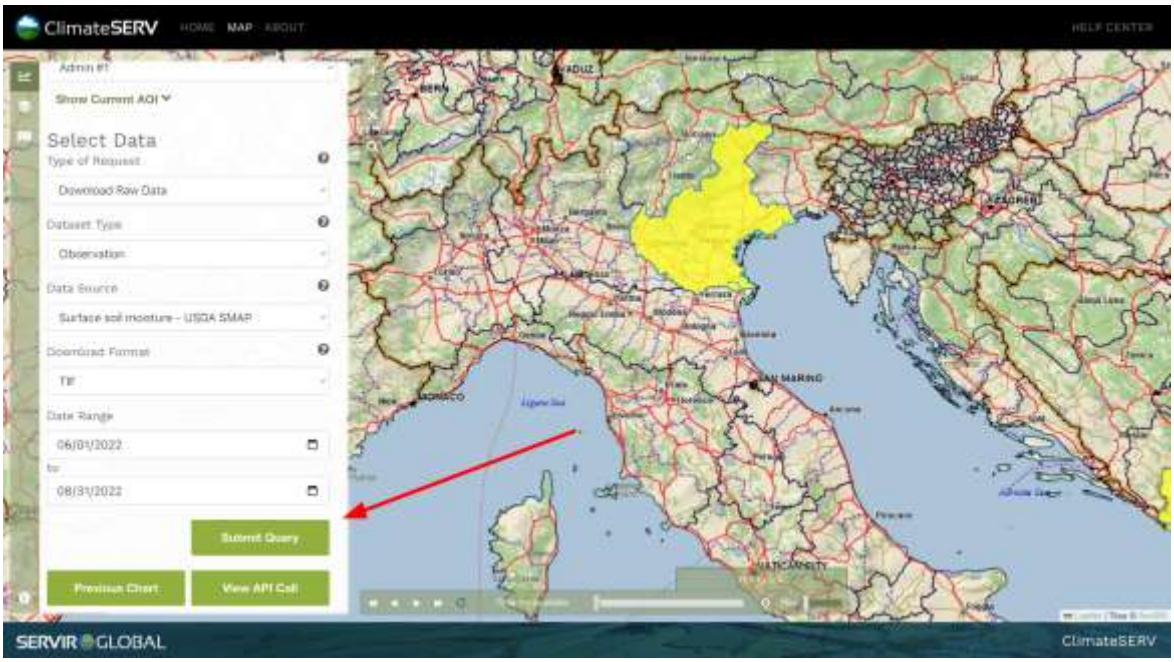
Now we will select the file format for our data download. Click the dropdown menu (indicated by the arrow in the image below) under the text that says **“Download Format”**. We have the option to download the files as either NetCDF or .tif files. For this exercise, click **“TIF”**. For more information on NetCDF files, Click here to read the ArcGIS documentation on NetCDF files. Or click here to view the Unidata documentation of NetCDF files. For more information on .tif files, click here to visit the ScienceDirect TIF documentation. Alternatively, Click here to visit the Heavy.AI TIF Documentation.



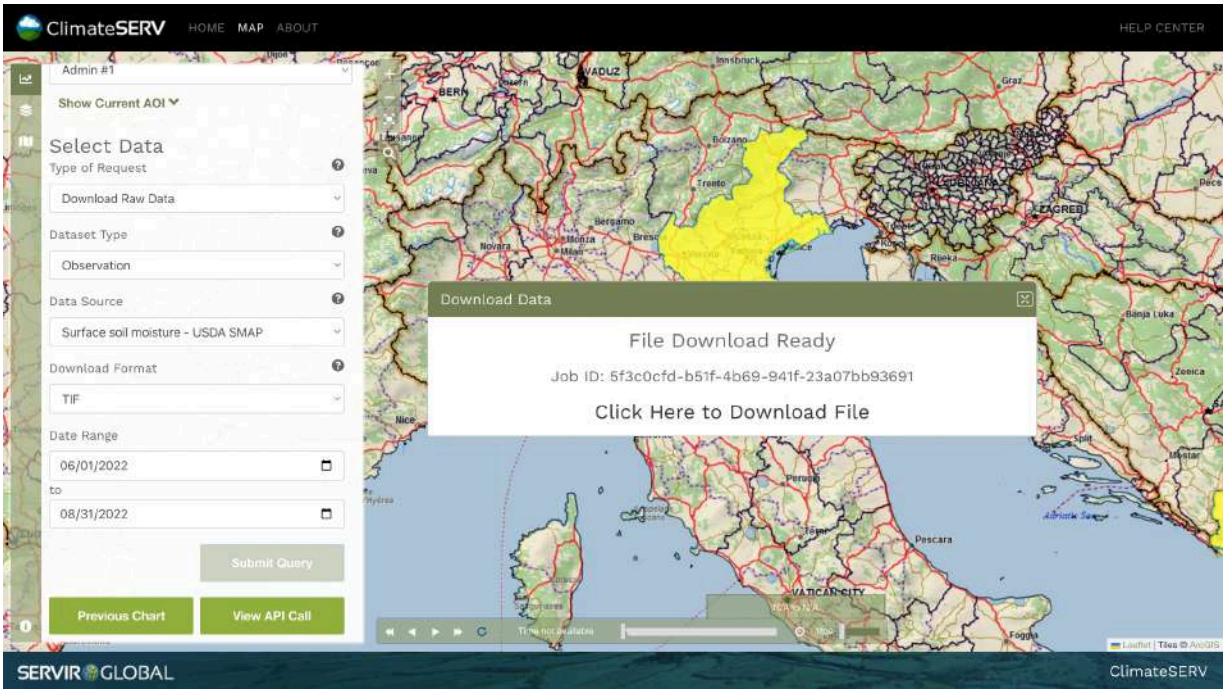
Finally, select the start and end dates for your data visualization by clicking the calendar icon under the text that says **“Date Range”** (as shown by the arrow in the screenshot below). UCSB CHIRPS data is available from 1981 - present day (with a latency of about a month), so you can select any date within this range.



Now that we have selected our dataset type, dataset source, download format, and date range, we are ready to download our data. Click the green "**Submit Query"** button, as shown in the image below.

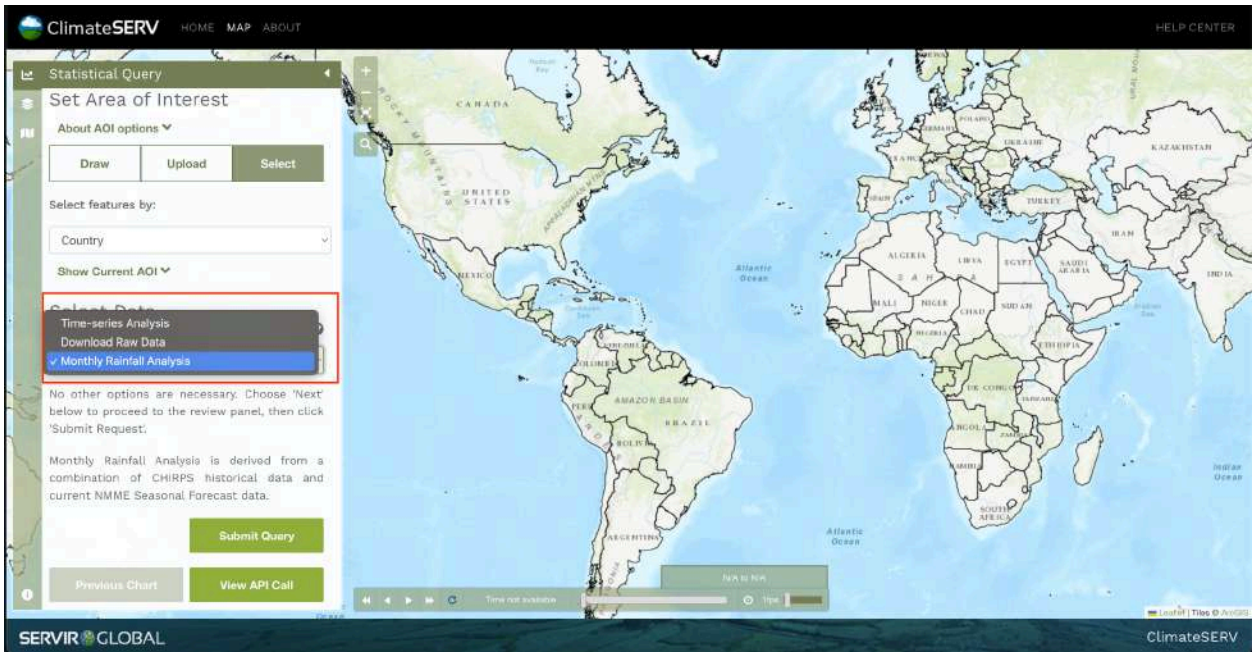


After clicking **"Submit Query"**, a window will popup that says "File Download Ready". This could take some time depending on the size of the region and range of time queried. Click on the text that says **"Click Here to Download File"**. Your data will be downloaded to your "Downloads" folder of your computer in a .zip folder.

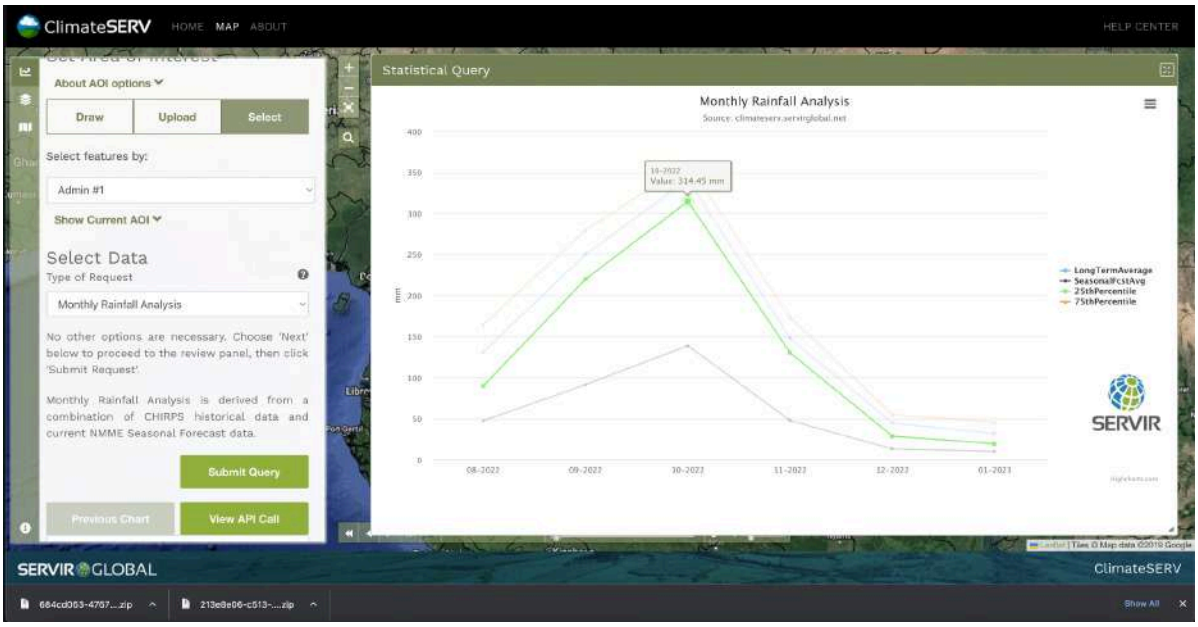


C. Monthly Rainfall Analysis Mode

This type of request allows us to view the rainfall forecast (from NMME data) up to six months in the future alongside the historical average rainfall (from CHIRPS data). To select this mode, click the dropdown menu below the text that says **"Type of Request"**, then click **"Monthly Rainfall Analysis"** as shown in the screenshot below.

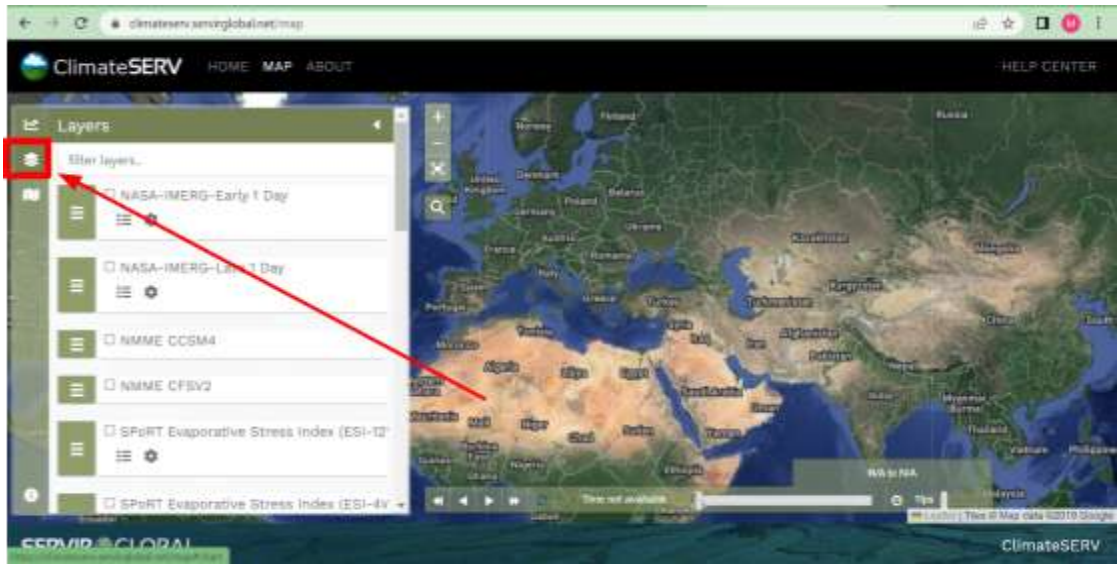


Now that we have selected our dataset, region, and time period of interest, we are ready to visualize the data! Click the green **"Submit Query"** button.



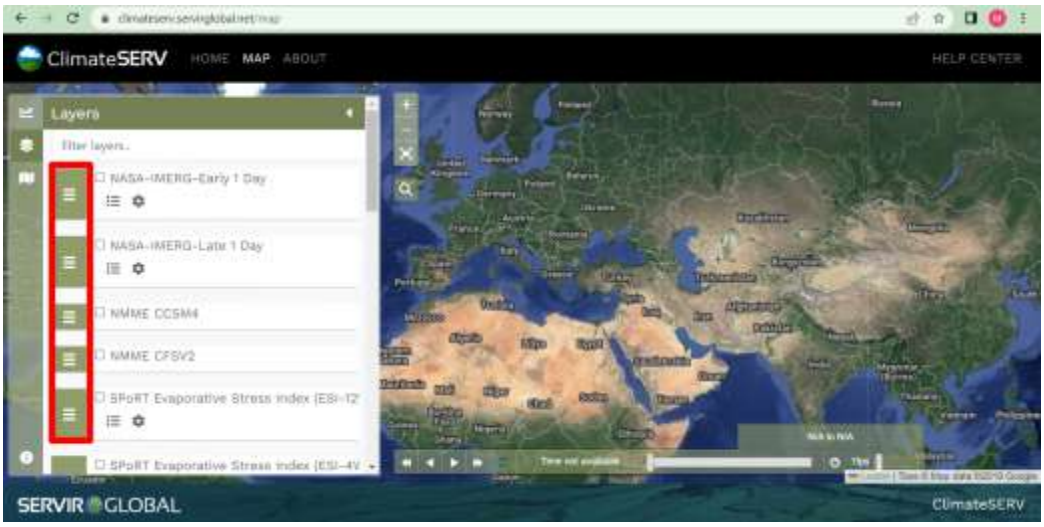
Chapter 2: Layers Panel

While the statistical query panel is great for viewing how data varies temporally over your region of interest, the layers panel is better suited for analyzing how data changes spatially within your region. Click the layers panel –indicated by the red arrow below – to expand or hide the layers panel.

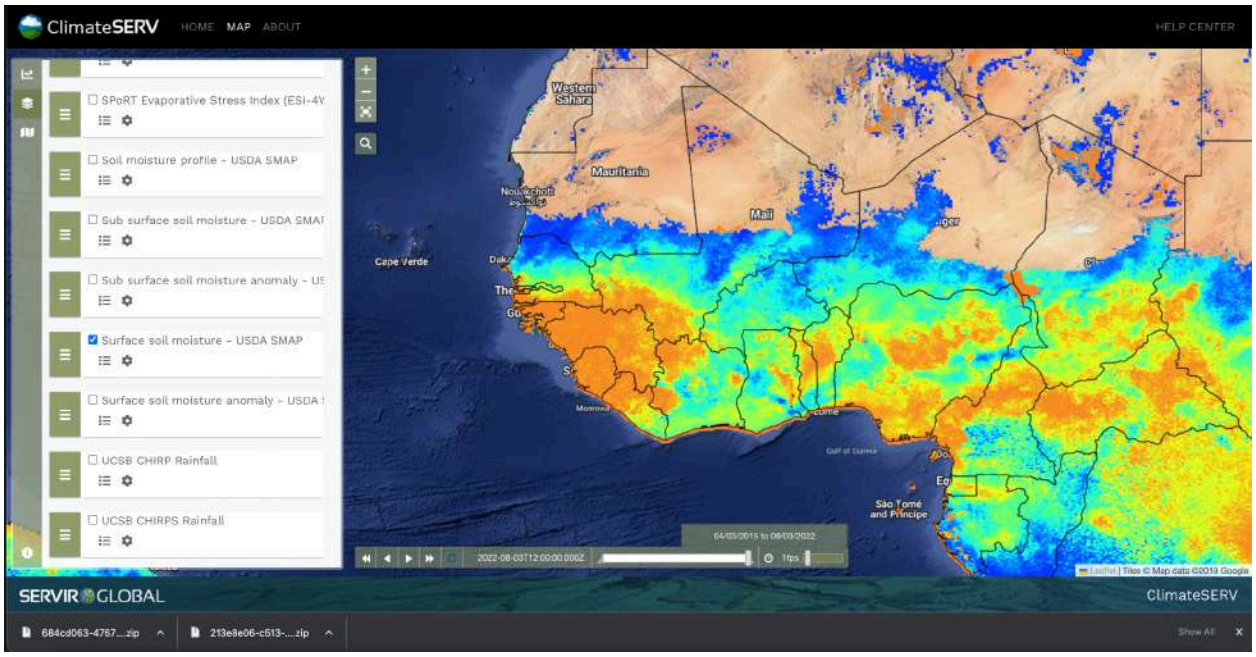


A. Displaying Datasets

This panel shows the various datasets available within ClimateSERV. You can rearrange the order in which these datasets appear by clicking on and dragging the green icon with three horizontal lines and dragging up or down. This icon is highlighted in red in the picture shown below.

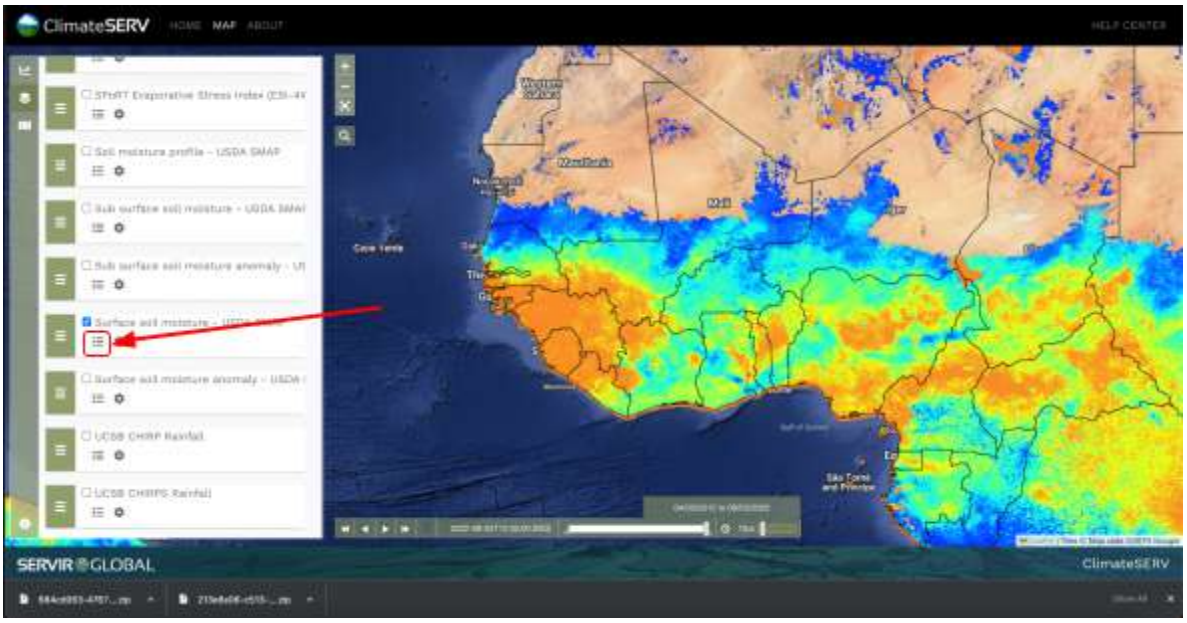


Clicking the box next to a dataset will display the values from that dataset on your map (as shown in the image below). To learn more about the characteristics of each dataset, see the ClimateSERV Dataset Encyclopedia. Click here to view the ClimateSERV Dataset Encyclopedia. For this exercise, click the box next to the dataset that says **"Surface soil moisture – USDA SMAP"**. After clicking, you will see a check mark appear in the box, and your screen will appear similar to the picture shown below.

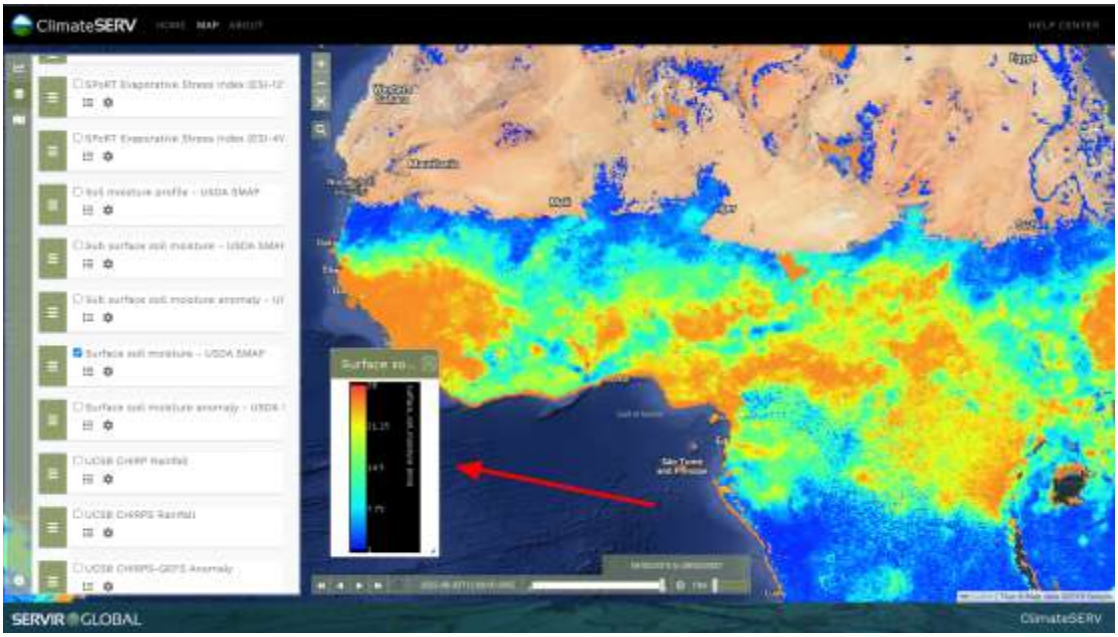


B. Color Scheme

To see what values each color on the map corresponds to, click the icon with three horizontal lines next to it, as highlighted in red below.

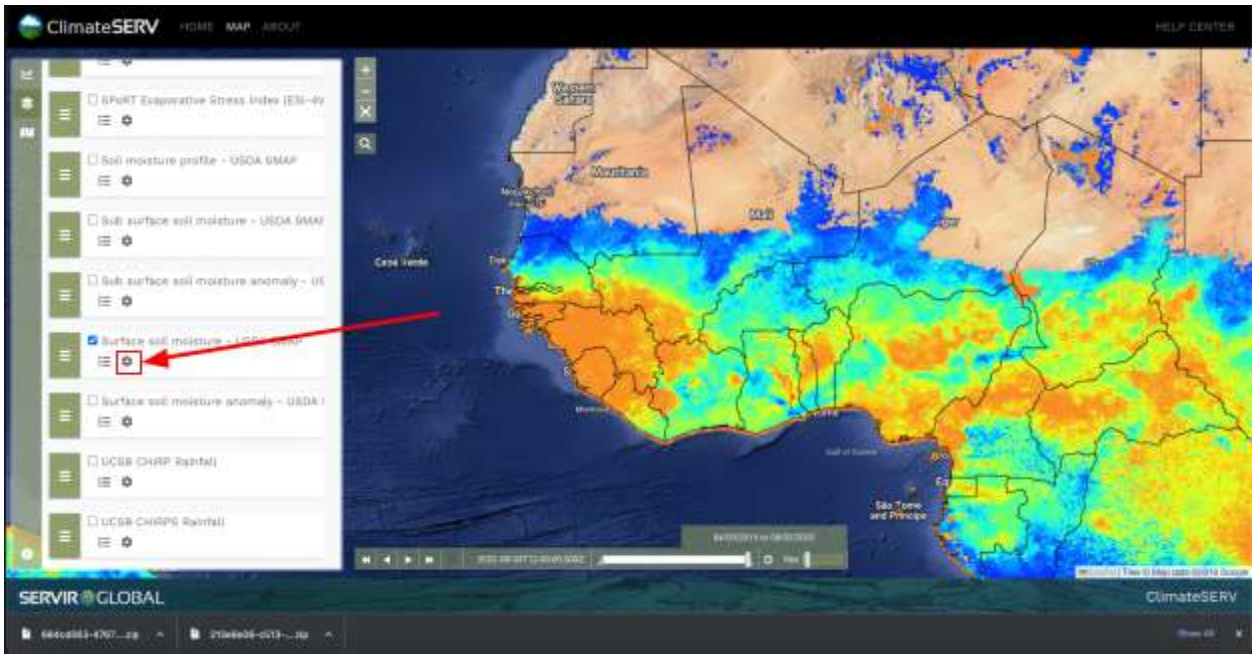


After clicking this icon, ClimateSERV will display the color bar (shown by the red arrow below), illustrating the value that each color represents on the map.

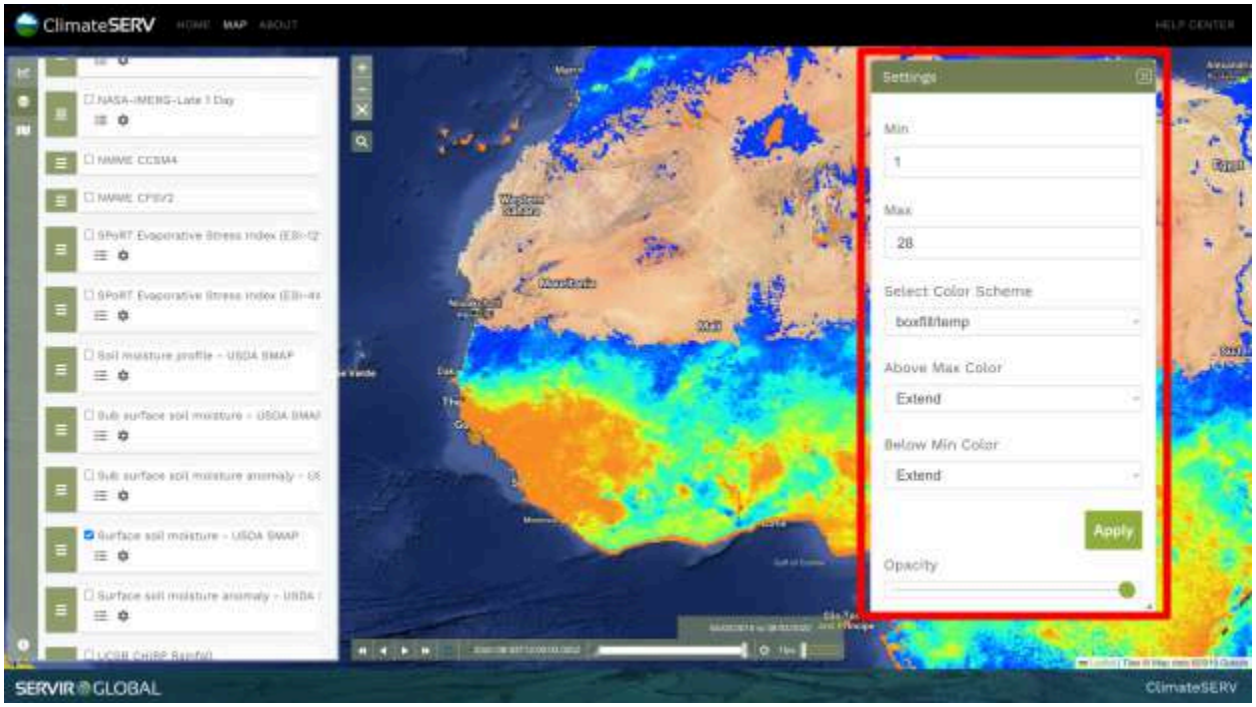


C. Layers Settings

To alter the display settings of this layer, click the icon that looks like a gear (indicated by the red arrow below).



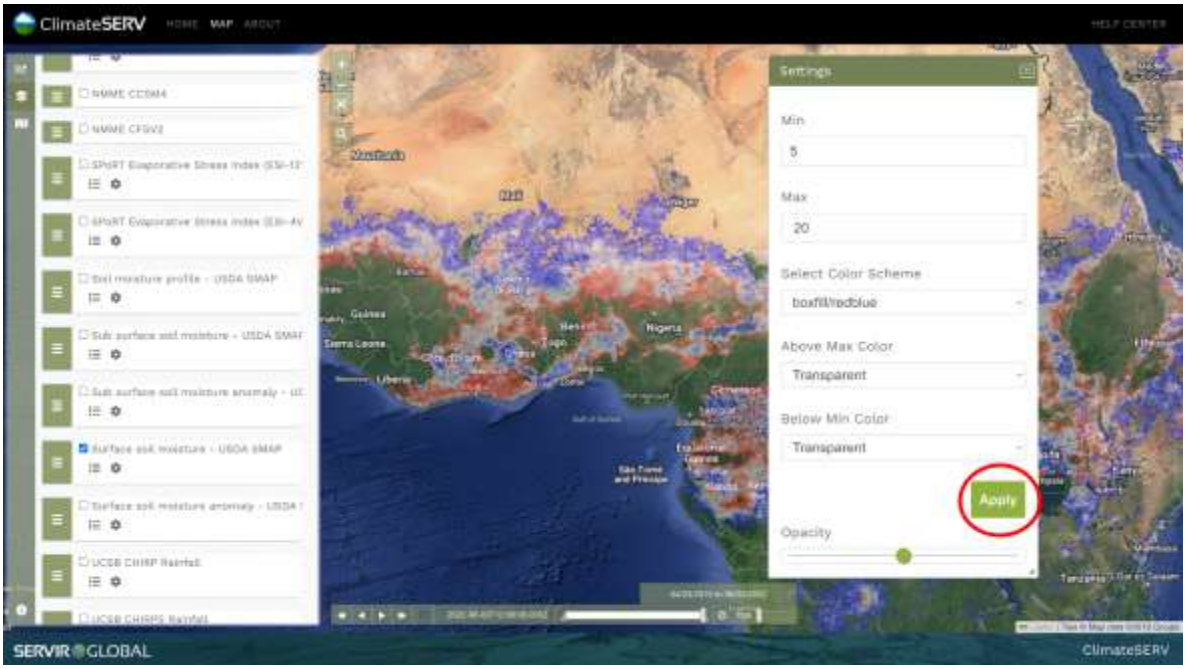
After clicking this icon, a settings panel will be displayed (as shown in the image below).



Within the settings panel, you can change the following settings:

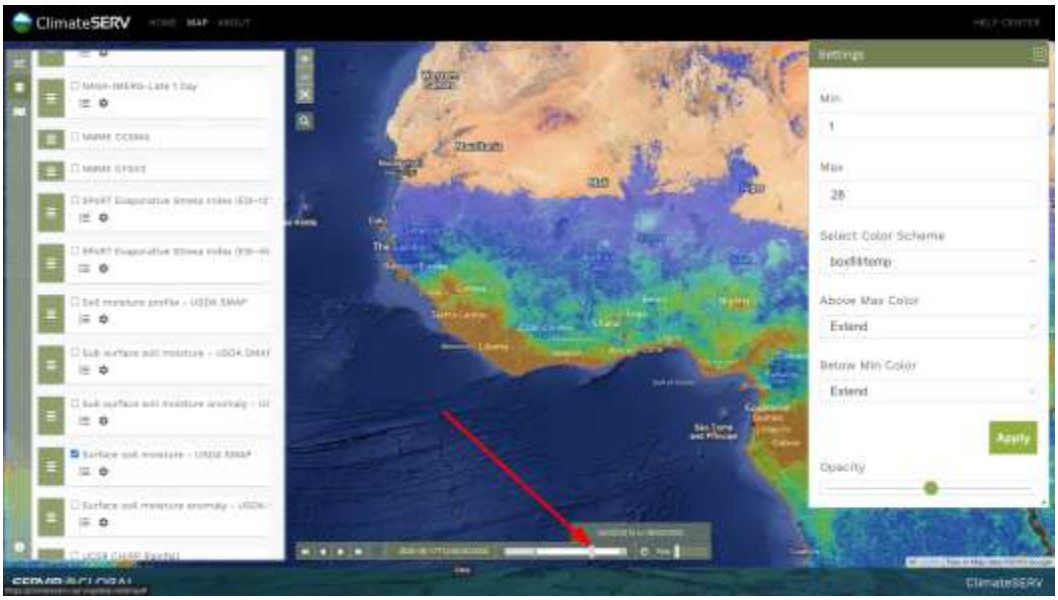
- **Min**
    - Controls the minimum value of the selected dataset
    - To view the units and range of different datasets, consult the ClimateSERV Dataset Encyclopedia. Click here to view the ClimateSERV Dataset Encyclopedia.
- **Max**
    - Controls the maximum value of the selected dataset
    - To view the units and range of different datasets, consult the ClimateSERV Dataset Encyclopedia. Click here to view the ClimateSERV Dataset Encyclopedia.
- **Select Color Scheme**
    - Controls different color schemes you can use to visualize your dataset
- **Above Max Color**
    - Controls what ClimateSERV will display for dataset values that fall above the max value you specified.
        - If you select **"Transparent"**, values above the max value will appear transparent.
        - If you select **"Extend"**, values above the max value will appear as the color associated with the max value.
- **Below Min Color**
    - Controls what ClimateSERV will display for dataset values that fall below the min value you specified.
        - If you select **"Transparent"**, values below the min value will appear transparent.
        - If you select **"Extend"**, values below the min value will appear as the color associated with the max value.
- **Opacity**
    - Will adjust the opacity of the dataset layer such that you can more easily see the basemap below.

Experiment with the different settings by changing the values. After adjusting your settings as needed, click the green **“Apply”** button (circled in red below) to reflect your changes in the map interface.

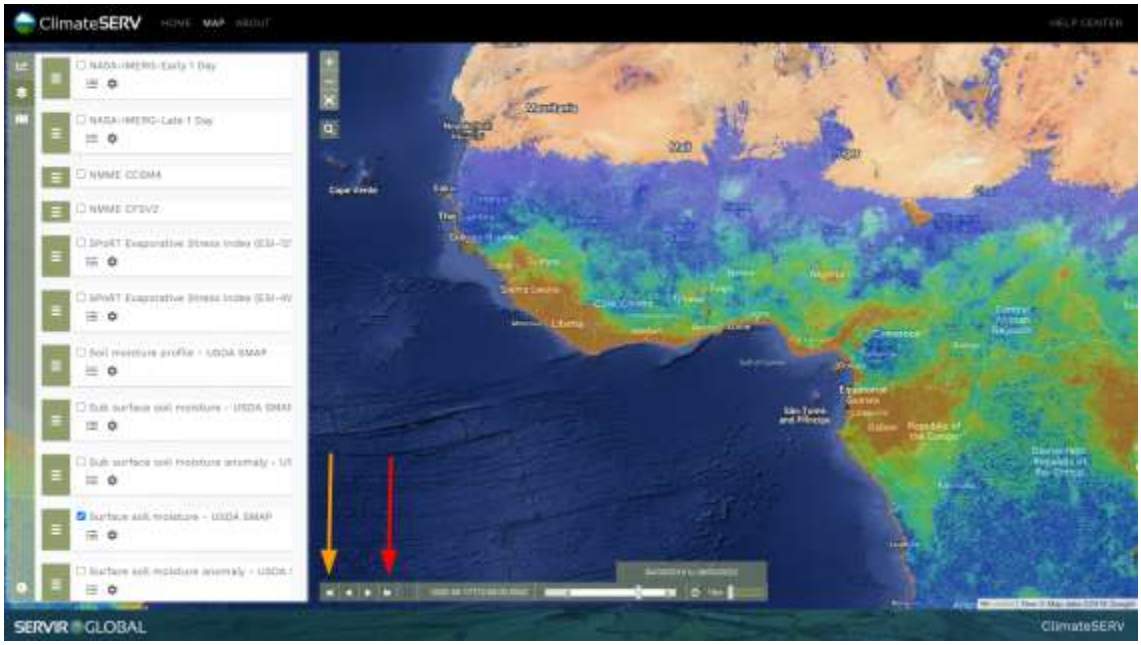


D. Temporal Options

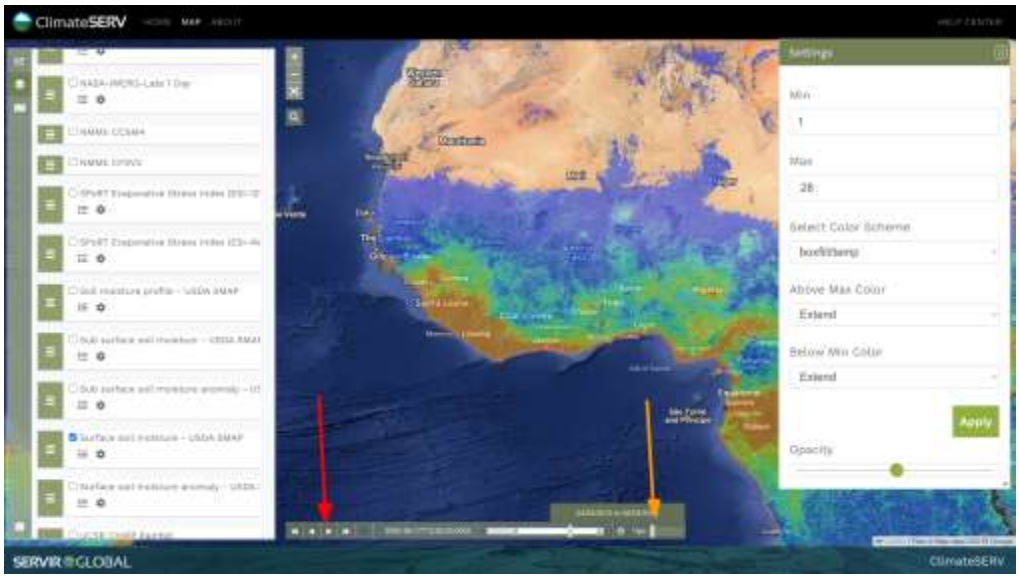
We know that selecting a dataset displays the data in ClimateSERV, but what date is this data being pulled from? To answer this question, look towards the bottom of the map interface, and you will see the time slider, indicated by the red arrow in the image below.



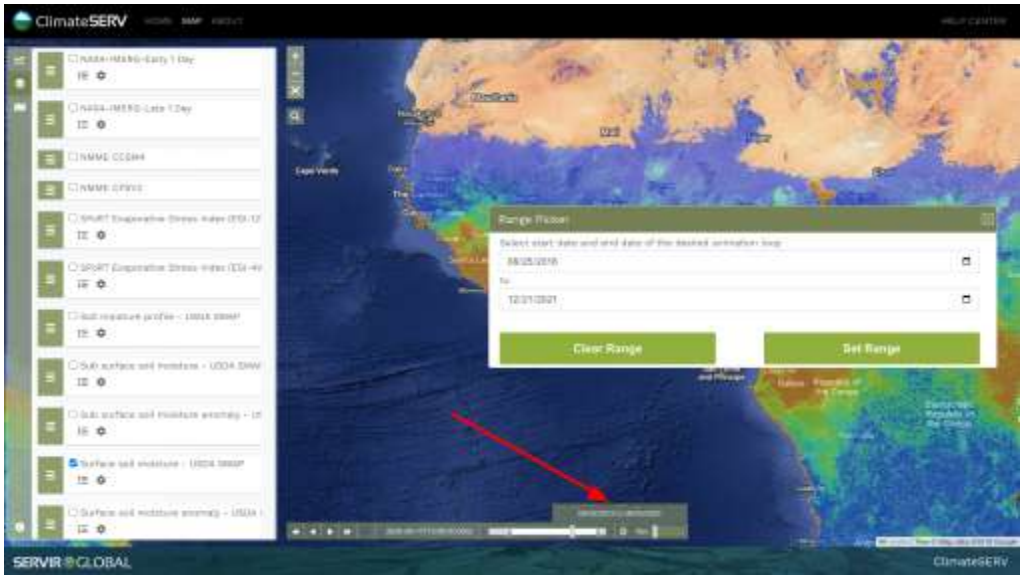
Click and drag the slider to change the date ClimateSERV pulls the data from. ClimateSERV will display the data taken from the date and time shown to the left of the slider. You can also click the fast forward button (highlighted by the red arrow below) or rewind button (highlighted by the orange arrow below). These buttons will move you either forward or backward one frame at a time.



Pressing the play button (indicated by the red arrow below) will animate your data. To increase or decrease the frames per second, adjust the slider on the right (indicated by the orange arrow in the image below).



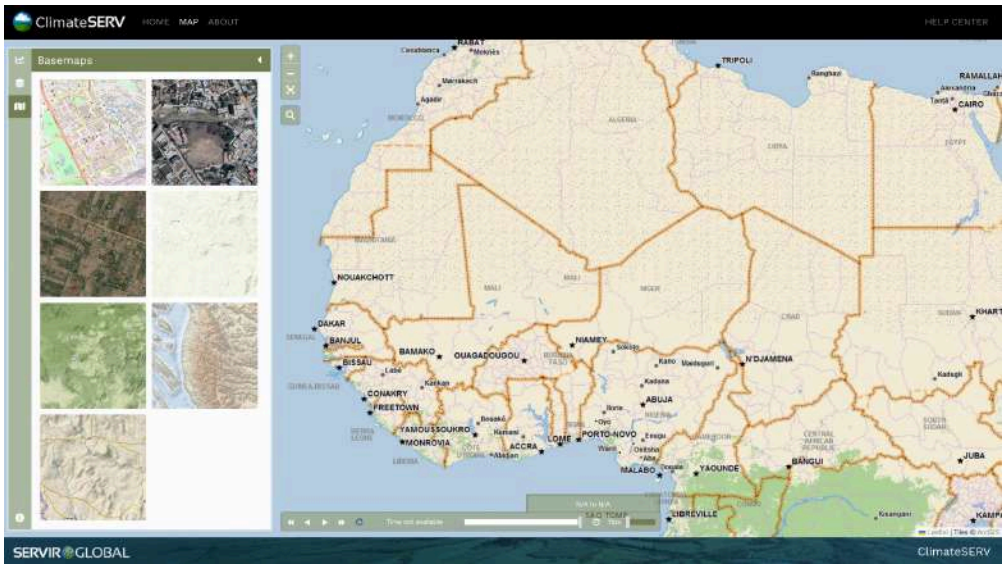
To adjust the time range that ClimateSERV animates the data over, click the **"Range Picker"** – indicated by the red arrow in the image below. Clicking this will bring up a panel where you can enter your start and end date (also shown below).



Chapter 3: Basemaps Panel

The Basemaps Panel allows you to change the basemap, or background imagery, that appears within Collect Earth Online. Click the Basemaps Panel Icon (indicated by the red arrow in the image below) to expand or hide the basemaps menu.

Clicking the different panels here will change the basemap that ClimateSERV will display. You can select from OpenStreetMaps, satellite imagery, DeLorme, bathymetry, or topographic maps. Below you can see how ClimateSERV appears using the DeLorme basemap.



Congrats! You are officially ready to work with data in ClimateSERV!

Appendix: External Links

- External Link 1: ClimateSERV Map page. Click Here to visit ClimateSERV's Map page
- External Link 2: ClimateSERV Homepage. Click here to visit ClimateSERV's homepage.
- External Link 3: TerraMonitor Article: “Shapefile vs. GeoJSON vs. GeoPackage.” Click here to read this article and learn more about various geospatial file formats.
- External Link 4: ClimateSERV Dataset Encyclopedia Click here to visit the ClimateSERV Dataset Encyclopedia.
- External Link 5: ArcGIS NetCDF Documentation. Click here to visit the ArcGIS NetCDF Documentation.
- External Link 6: Unidata NetCDF Documentation. Click here to visit the Unidata NetCDF Documentation.
- External Link 7: ScienceDirect TIF Documentation. Click here to visit the ScienceDirect TIF documentation.
- External Link 8: Heavy.AI TIF Documentation. Click here to visit the Heavy.AI TIF Documentation.