

Mapping with Tableau

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Race, Crime, and Criminal Justice

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NULab for Texts, Maps, and Networks

Introduction

This introductory hands-on tutorial is for using Tableau for basic point mapping. Students will:

- Be introduced to Tableau
- Understand how to import and modify data in the Tableau environment
- Plot coordinate points onto a basemap
- Filter data in a variety of ways to produce custom visualizations

To follow along, visit <http://bit.ly/diti-fall2019-martinez>

Tableau Basics

Tableau is a powerful visualizations tools recently purchased by SalesForce. It can produce a variety of beautiful charts a graphs that look much nicer than basic Excel visualizations.

Tableau can also do basic mapping!

A Tableau license is available for free for students with a .edu email address. You can use the key on two different devices.

Link to Tableau for students:

<https://www.tableau.com/academic/students>

Key Terminology

- **X/Y Coordinates:** Numerical values that allows every location on earth to be pinpointed.
 - **Latitude/Longitude:** Latitude is the north/south coordinate of a location based upon its distance from the equator. Longitude is the west/east coordinate of a location based upon its distance from the standard meridian.
- **Dimension:** “Qualitative values (such as names, dates, or geographical data). You can use dimensions to categorize or segment your data.”
- **Measure:** “numeric, quantitative values that you can measure. Measures can be aggregated. When you drag a measure into the view, Tableau applies an aggregation to that measure (by default).”

Using Tableau

Step One: Connecting to Data

First, we need to connect to our data.

For the purposes of this exercise, we will be using homicide data from Miami-Dade County in Excel format.

Select 'Microsoft Excel' and navigate to the data file that was sent via email.

The screenshot shows the Tableau software interface. On the left, a dark blue sidebar titled 'Connect' lists various data sources: 'To a File' (with 'Microsoft Excel' highlighted by a red box and a red arrow pointing to it), 'Text file', 'JSON file', 'Microsoft Access', 'PDF file', 'Spatial file', 'Statistical file', and 'More...'. Below this, under 'To a Server', are 'Tableau Server', 'Microsoft SQL Server', 'MySQL', 'Oracle', 'Amazon Redshift', and 'More...'. At the bottom of the sidebar are 'Saved Data Sources' with links to 'Sample - Superstore' and 'World Indicators'. The main area of the window is titled 'Open' and shows a 'Discover' panel on the right with sections for 'Training' (links to 'Getting Started', 'Connecting to Data', 'Visual Analytics', 'Understanding Tableau', and 'More training videos...'), 'Resources' (links to 'Get Tableau Prep' and 'Blog - New in Tableau Prep Builder: Visual filtering and improved data standardization'), and 'Forums'. At the bottom right is an orange banner for 'TABLEAU CONFERENCE' with the text 'SEE YOU AT TC19', 'Don't get left out(lier)', and 'Register now →'. The bottom right corner also has the text 'Update to 2019.2.1 Now'.

Using Tableau, Step Two: Convert Coordinate Column to Geo Data

We can change the data type of our columns by clicking on the # or Abc at the top of the column display.

In order to map our data, we have to first convert the X/Y data into a coordinate class.

We can do this by clicking on the #, hovering over 'Geographic Role,' and clicking on Latitude or Longitude. Convert:

X -> Latitude

Y -> Longitude

The screenshot shows the Tableau interface with a data source named "Miami Homicide Raw Data excel". The "Sheet1" tab is selected. A context menu is open over the "X Incident" column header, specifically at the top where the column type is indicated by a "#". This menu is titled "Geographic Role" and includes options like "Number (decimal)", "Number (whole)", "Date & Time", "Date", "String", "Boolean", "Default", and "Geographic Role". The "Geographic Role" option is highlighted with a red box. A second red box highlights the "Latitude" and "Longitude" options under "Geographic Role". The main data table shows various demographic categories and their corresponding coordinates.

# Sheet1 W Cuban	# Sheet1 B Cuban	# Sheet1 NH Black	# Sheet1 All Black	# Sheet1 All White	# Sheet1 All Latino	# Sheet1 X Incident	# Sheet1 Incident	# Sheet1 CensusTract10 Inc...	# Sheet1 X Victim
0	0	0	0	0	1	25.7922	2,086,003,003	Census Tract 30.03	
0	0	0	0	1	0	25.9013	2,086,000,308	Census Tract 3.08	
0	0	0	0	0	1	25.8600	2,086,000,604	Census Tract 6.04	
0	0	1	1	0	0	25.8538	2,086,000,902	Census Tract 9.02	
0	0	1	1	0	0	25.8367	2,086,001,401	Census Tract 14.01	
0	0	0	0	0	1	25.6085	-		
0	0	1	1	0	0	25.7290	-80.2537		
0	0	0	0	0	1	25.7984	-80.3382		
0	0	1	1	0	0	25.9190	-80.2461		
0	0	0	0	1	0	25.7312	-80.2372		

Using Tableau

Step Three: Convert our Data

First, click on Sheet 1 at the bottom of the page to move to our worksheet.

Next, we need to convert our X/Y data from a measure to a dimension. Do this by dragging and dropping our data points up from the measures box to the dimensions box.

The screenshot shows the Tableau interface with the following details:

- Dimensions pane:** Contains fields like Marital Status, Method, Name, Narrative, Police Agency, Primary Death Circum..., Race, Secondary Death Circum..., Sequence Number, Sex, Specific Felony Circum..., Victim Drinking, Victim Home Address, Year, and Measure Names.
- Measures pane:** Contains fields like ME Case, NH Black, Number of Victims, Nwhitev, W Cuban, W Hispv, White Other, X Incident, X Victim, Y Incident, Y Victim, and Number of Records.
- Marks card:** Shows options for Automatic, Color, Size, Text, Detail, and Tooltip.
- Sheet 1:** The active worksheet where data can be dropped. It has three "Drop field here" areas.
- Panels:** Columns and Rows.
- Status bar:** Shows "Data Source" and "Sheet 1".
- Red highlights:** A red arrow points from the "X Incident" and "Y Incident" fields in the Measures pane up towards the Dimensions pane. A red box also highlights the "Sheet 1" tab at the bottom of the interface.

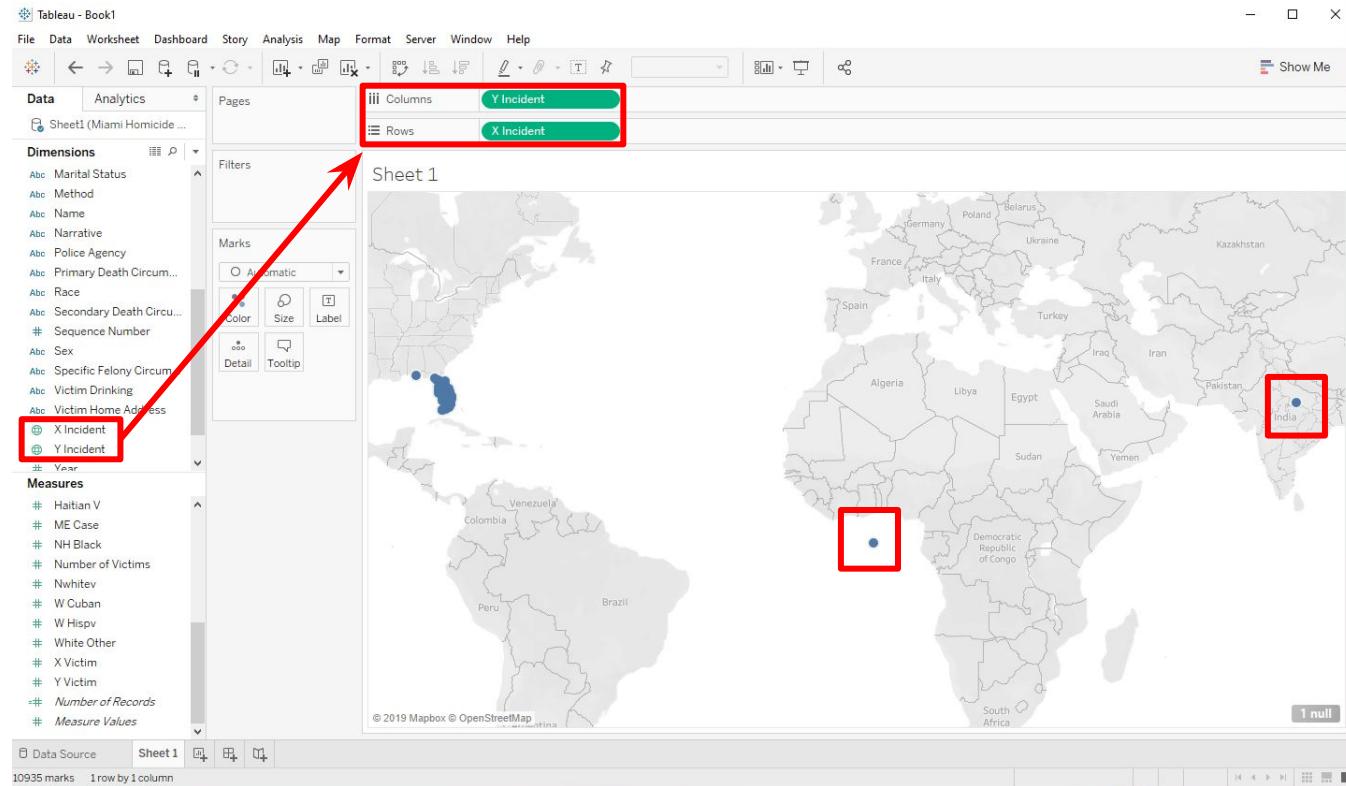
Using Tableau

Step Four: Plot our Points

To map our data points, we drag our Y data into the 'columns' area, and our X data in the 'rows' area.

Tableau will automatically plot our points based upon the X/Y coordinates.

There are stray points: one off the west coast of Africa, and another in northern India. We could fix this by filtering or cleaning our data, but we will ignore this for now.

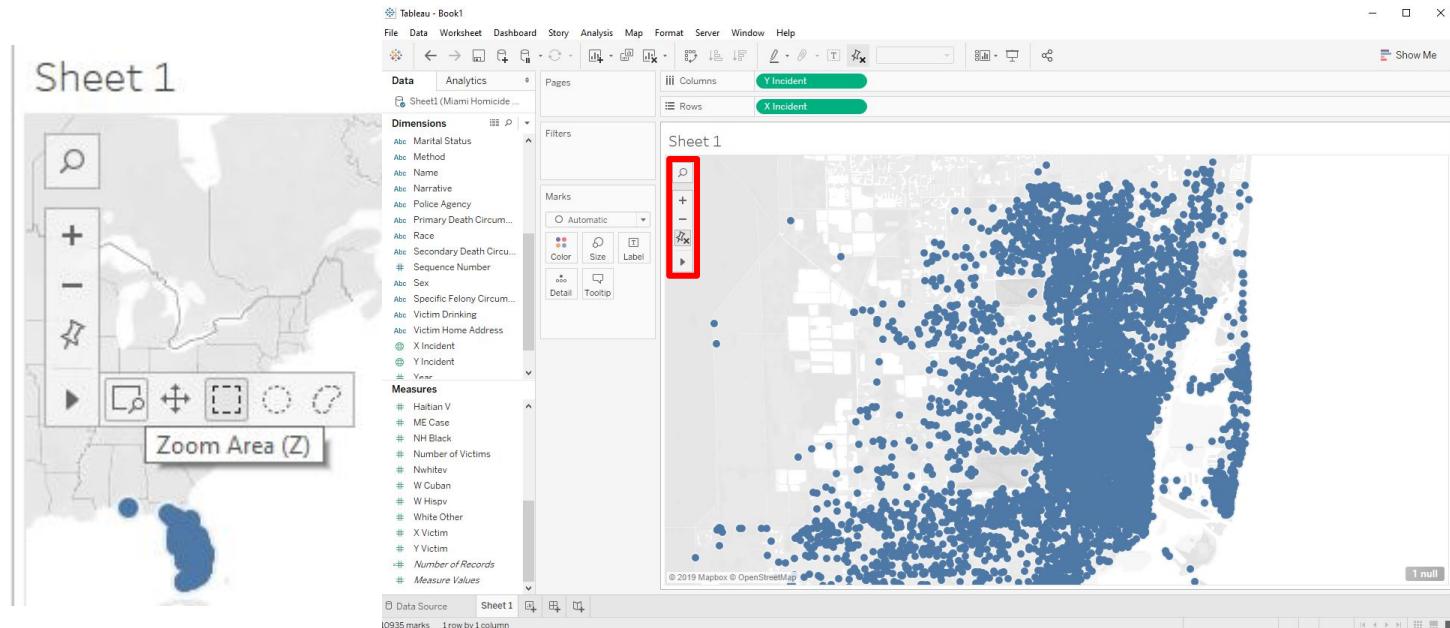


Using Tableau

Step Five: Zoom Controls

The navigation and zoom controls are in the top left of the plot area. We can use the zooming and panning tools to navigate to our area of interest.

We have zoomed into the Downtown Miami and Miami Beach areas.

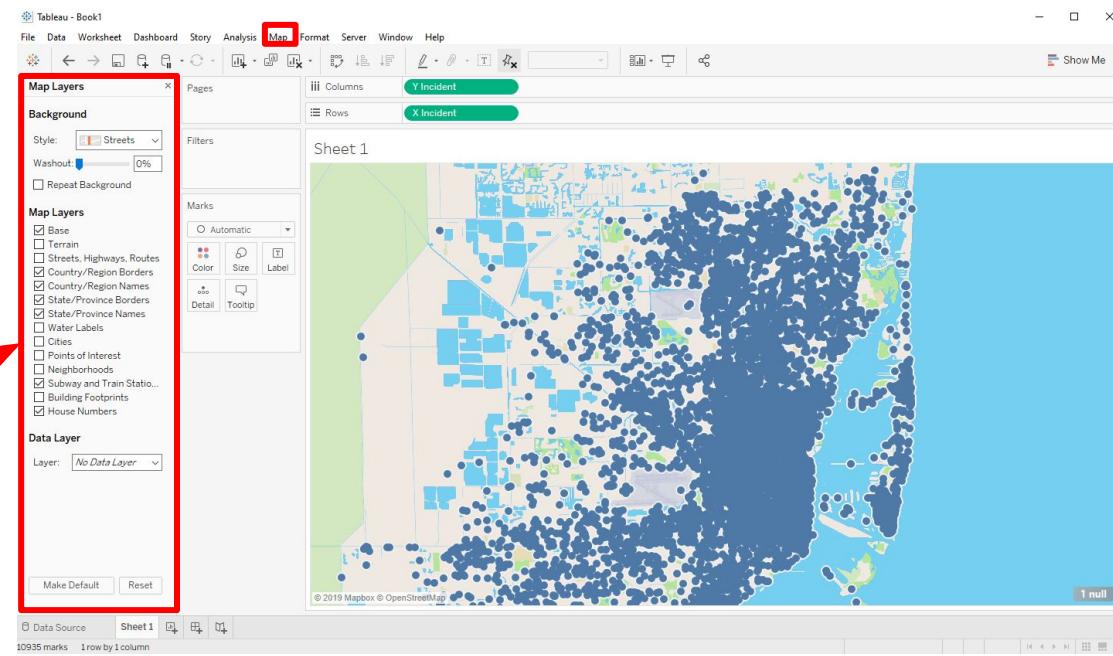
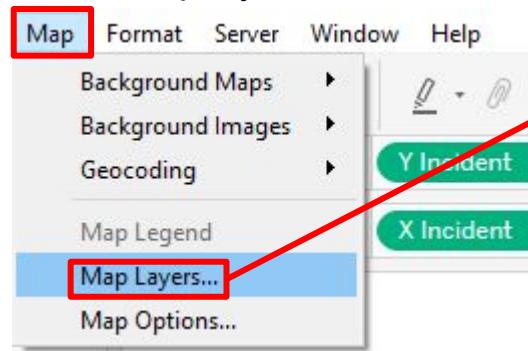


Using Tableau

Step Six: Modify Basemap

We can use the ‘Map’ > ‘Map Layers...’ option from the toolbar to modify our basemap.

We have changed our Style to ‘street.’ You may also want to toggle other Map Layers like ‘Streets, Highways, Routes.’ When you are done, click the X at the top of the map layers sidebar.



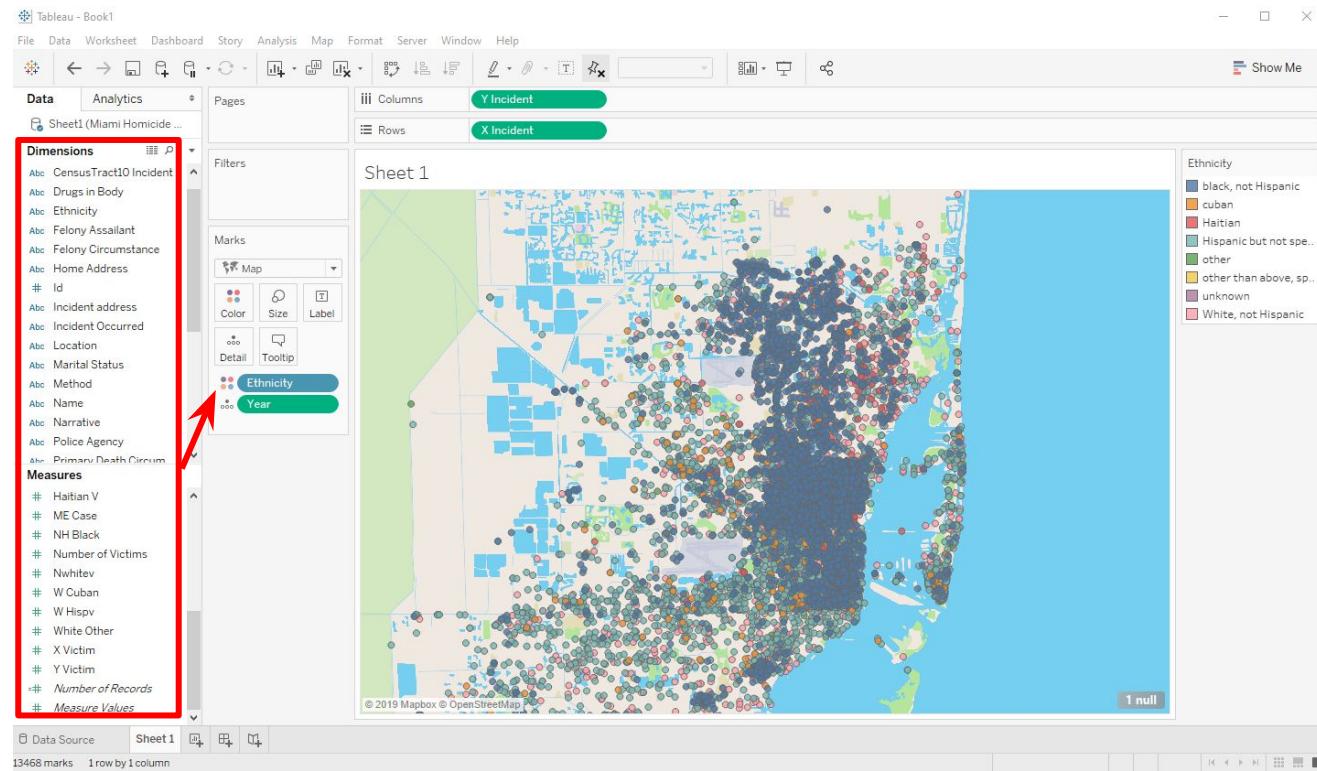
Using Tableau

Step Seven: Create Filters

To create different filters and visualization parameters, drag a dimension or measure into the ‘marks’ box. Change marks to “Map” in dropdown option.

To specify a type of visualization, drag the parameter of choice onto ‘color,’ ‘size,’ etc.

For this exercise, we have mapped ethnicity as a color, and year as a detail (which will appear as a tooltip).



Using Tableau

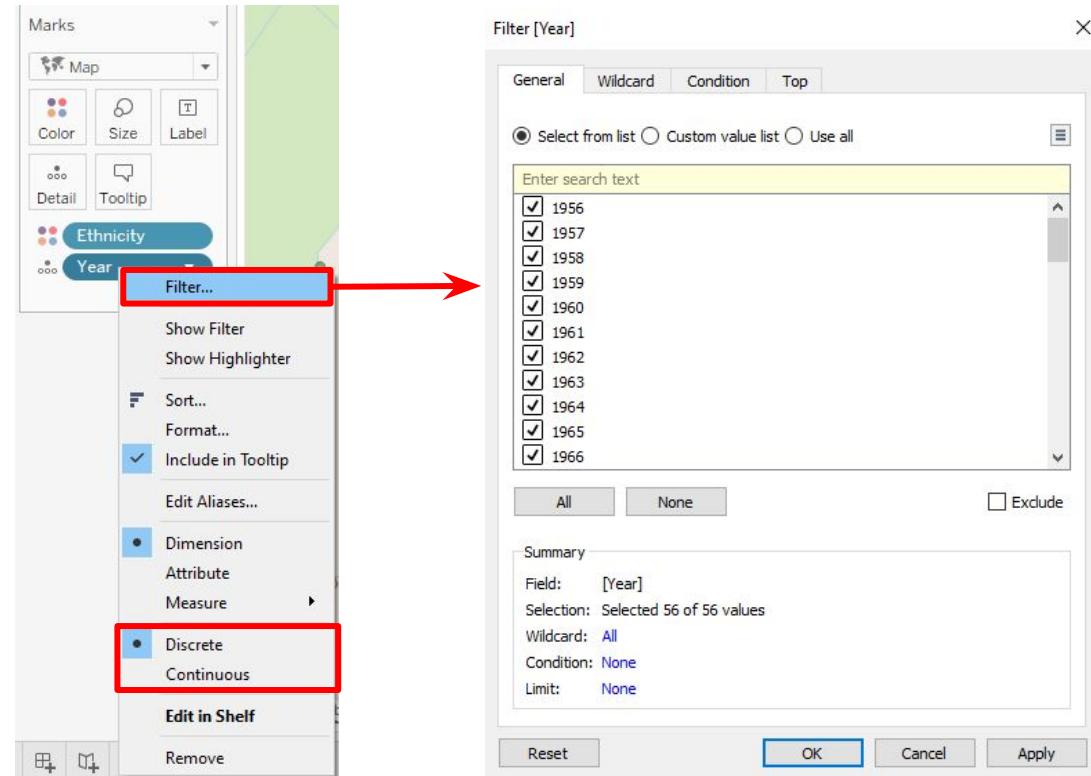
Step Seven: Create Filters Continued

For this exercise, we want to filter our year data parameter to only display murders for five years, 2007-2011.

First, we converted our dates into a discrete variable.

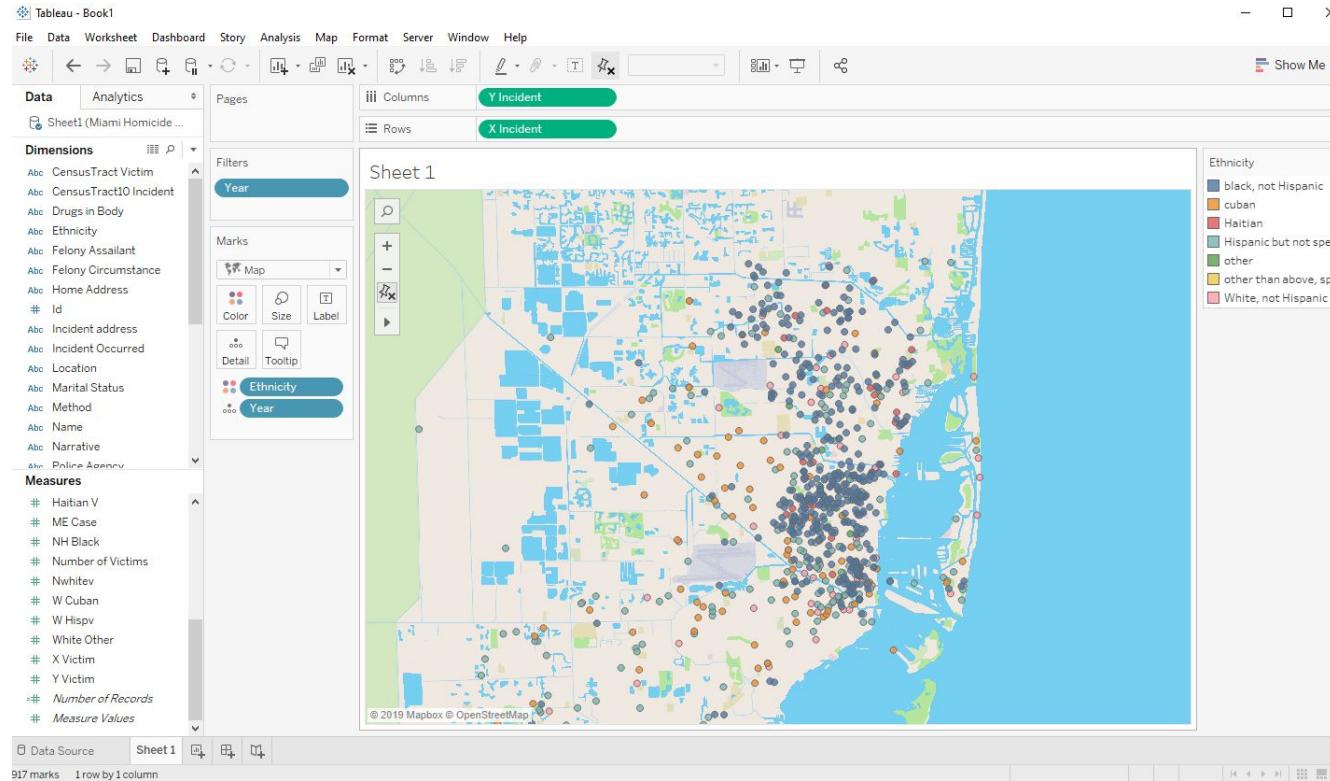
Next, we click on 'Filter...' This will bring up the filter box.

Now we will deselect all and then check the boxes for the years 2007-2011.



Using Tableau

Step Seven: Create Filters Results



Using Tableau

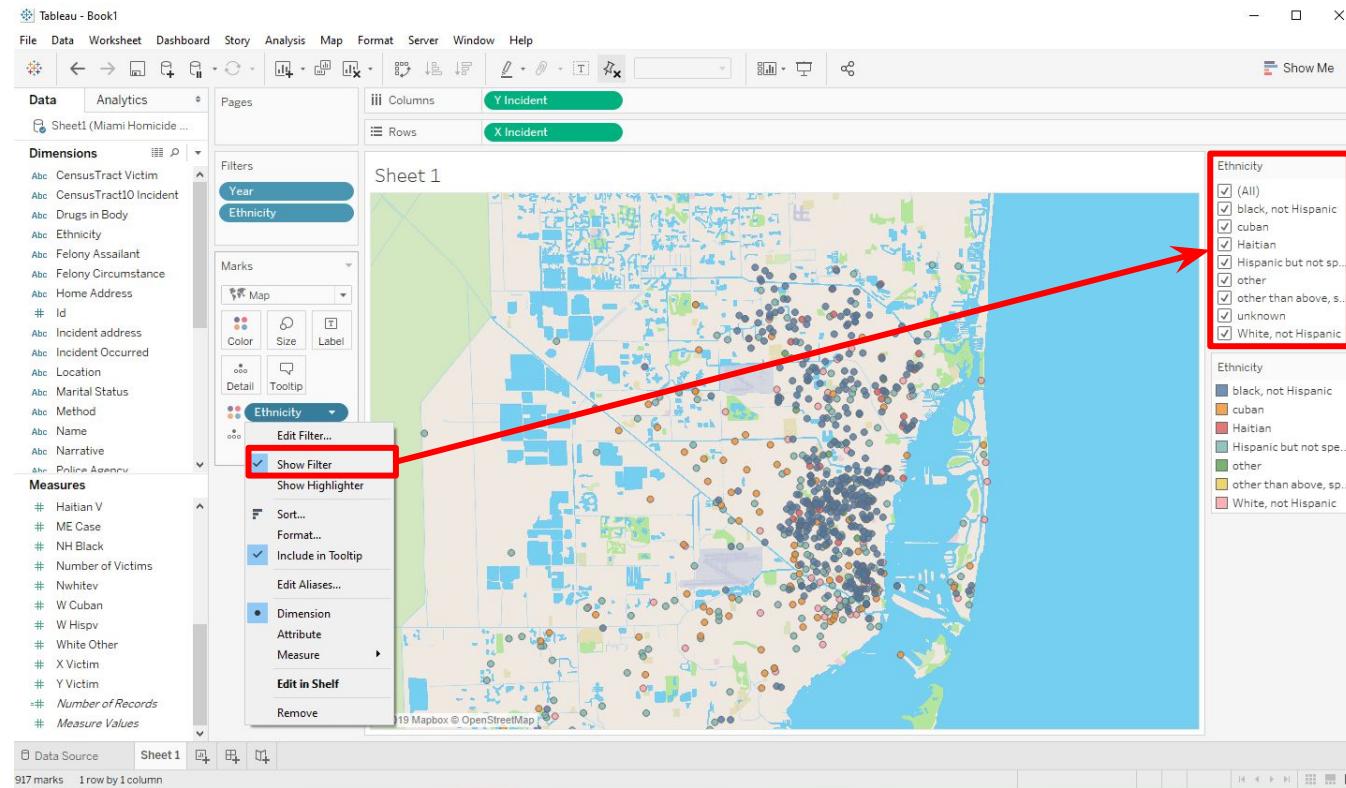
Step Seven: Create Filters Continued

The next step is to filter by ethnicity.

If we click on 'ethnicity' in the marks panel, we can then select 'show filter.'

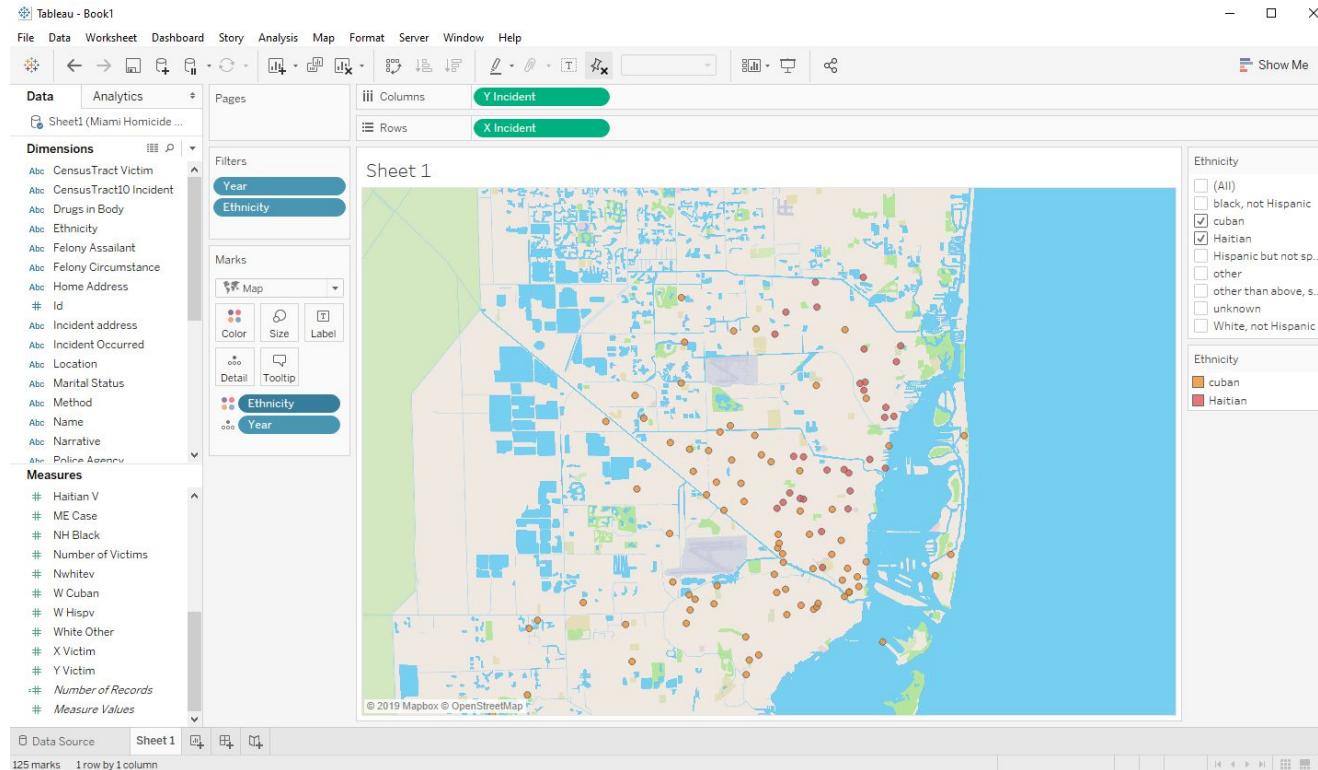
Show filter will then display the filter box we used for our dates, but as a sidebar. From here we can select or deselect filter parameters.

We will only select Cuban and Haitian for this exercise.



Using Tableau

Step Seven: Create Filters Results



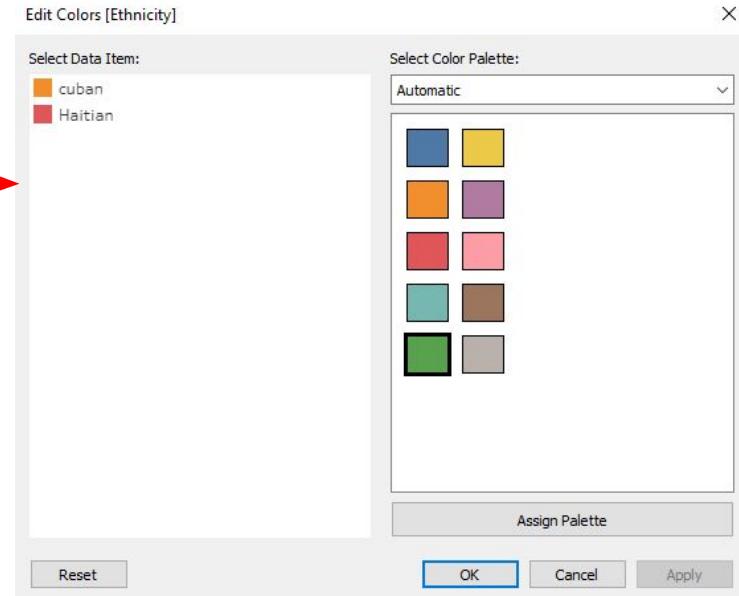
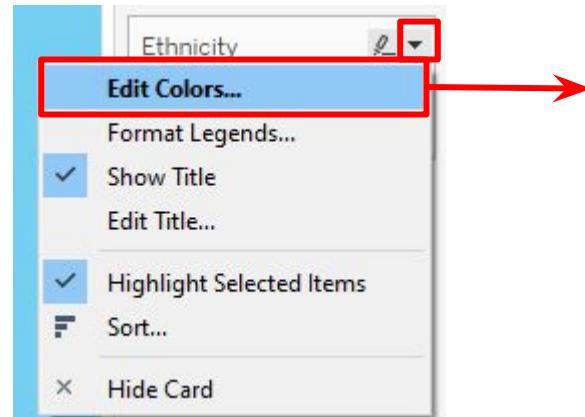
Using Tableau

Step Eight: Modify Colors

The orange and pinkish colors for Cubans and Haitians do not contrast very well, so we will now change the colors.

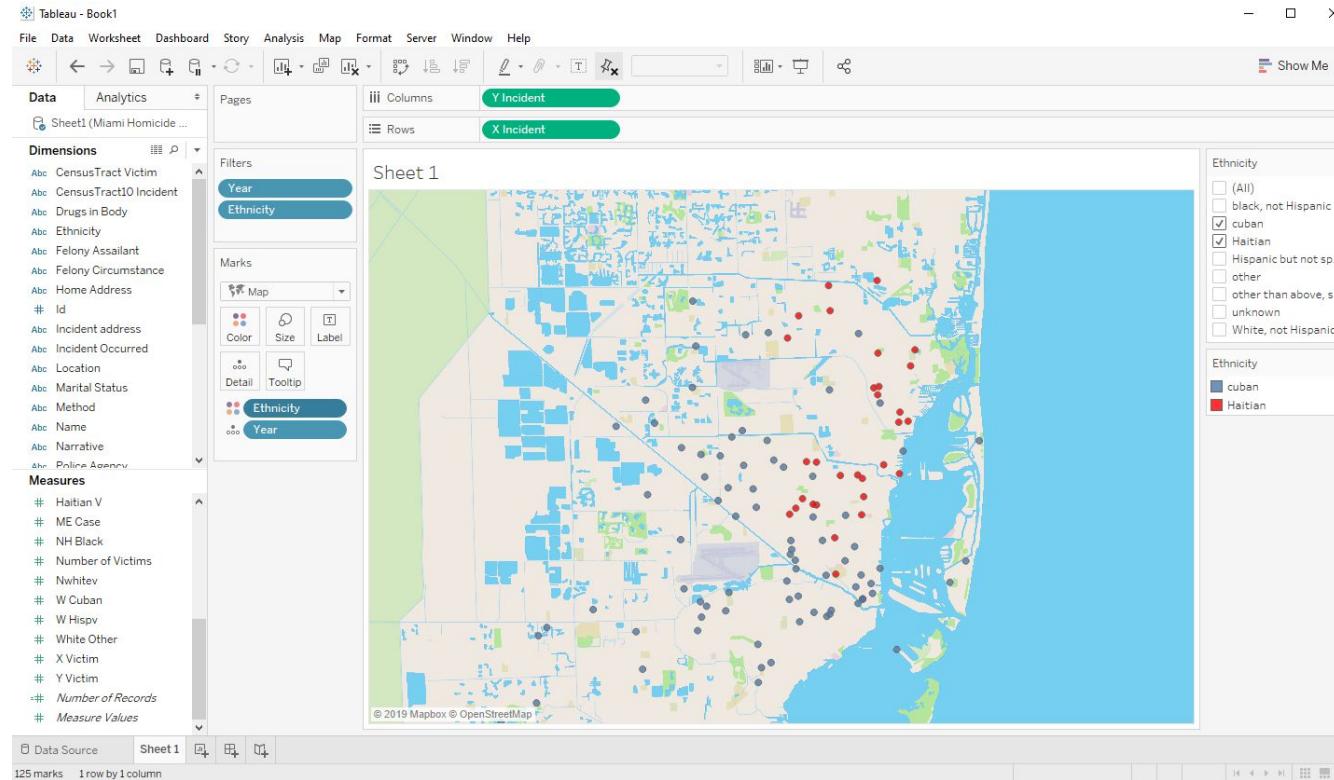
On the ethnicity sidebar, click the drop down arrow, then click on 'edit colors...'

On the edit colors box we can now change our colors to contrast more for better visualization.



Using Tableau

Step Eight: Modify Colors Results



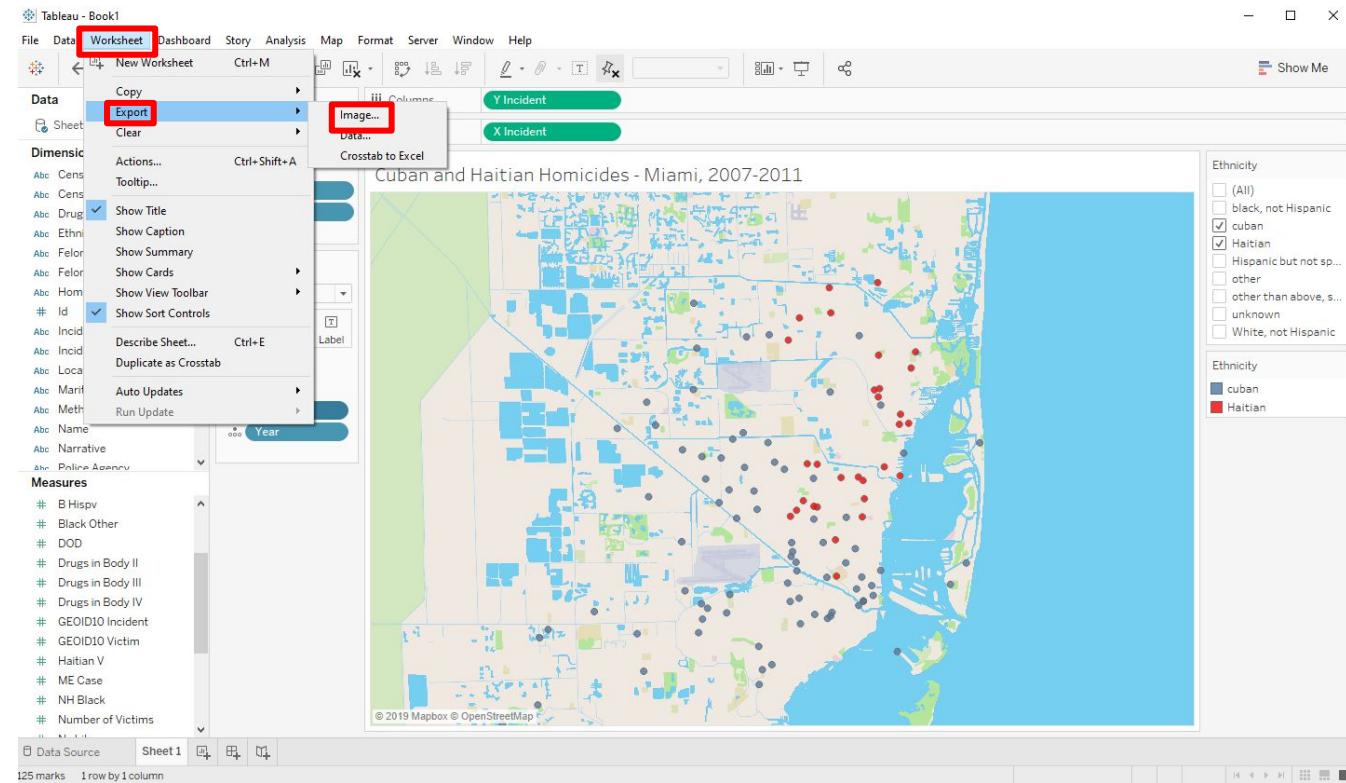
Using Tableau

Step Nine: Exporting Images

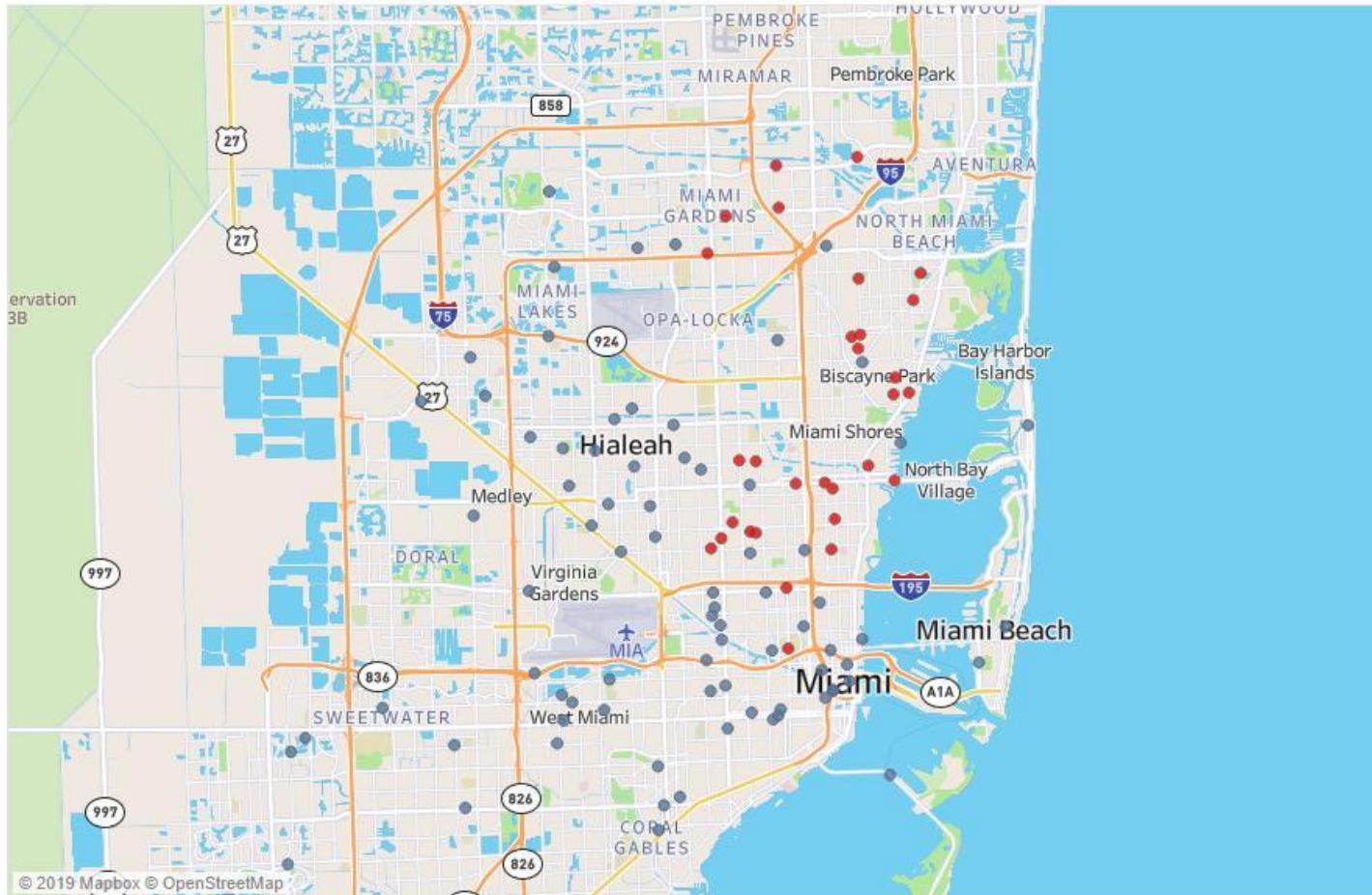
Once we are happy with our map after filtering for different data points, we can export our image.

From the ‘Worksheet’ drop-down menu, hover over ‘Export,’ then click on ‘Image...’ You can think select the type of export then click ‘save.’

Navigate to where you would like to save the image, name it, and change the file type if you would like - then click save.



Cuban and Haitian Homicides - Miami, 2007-2011



Map based on Y Incident and X Incident. Color shows details about Ethnicity. Details are shown for Year. The view is filtered on Year and Ethnicity. The Year filter keeps 2007, 2008, 2009, 2010 and 2011. The Ethnicity filter keeps cuban and Haitian.

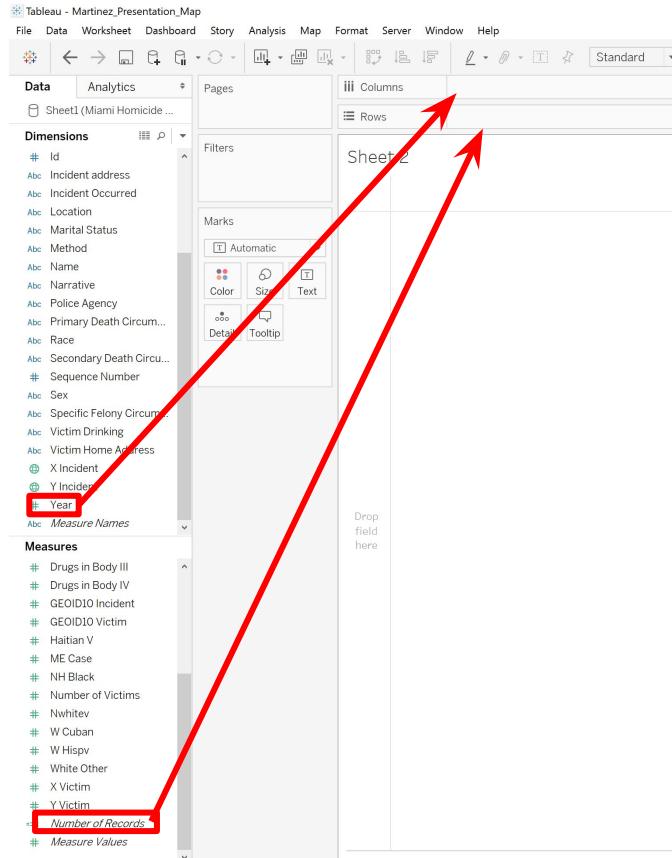
Graphs with Tableau: Drag & Drop

Similar to mapping, creating a graph is as simple as dragging and dropping our dimensions and measures.

In this demonstration, we will map the number of records over time according to ethnicity.

First, create a new sheet (click the + sign next to Sheet 1 at the bottom)

Next, we will drag and drop our ‘Year’ dimension to the columns, and the ‘Number of Records’ measure to the rows.



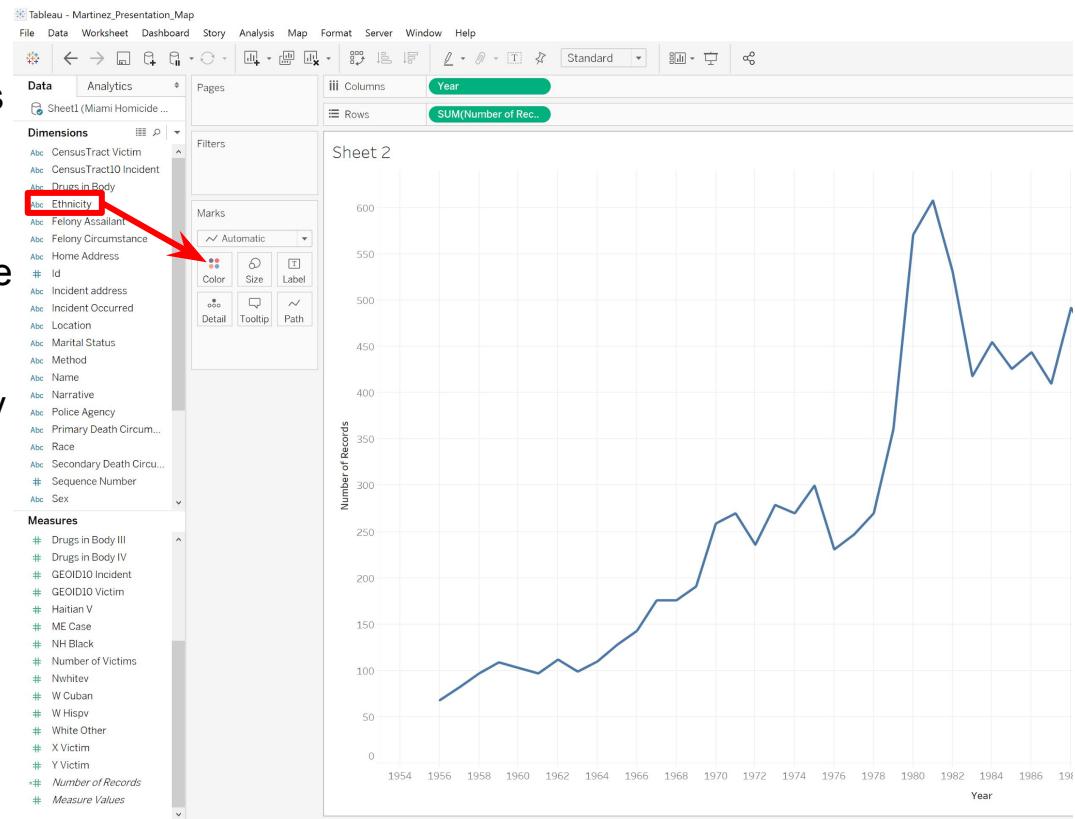
Graphs with Tableau: Drag & Drop

We now have a graph of records over time, but we still need to show specific ethnicities over time.

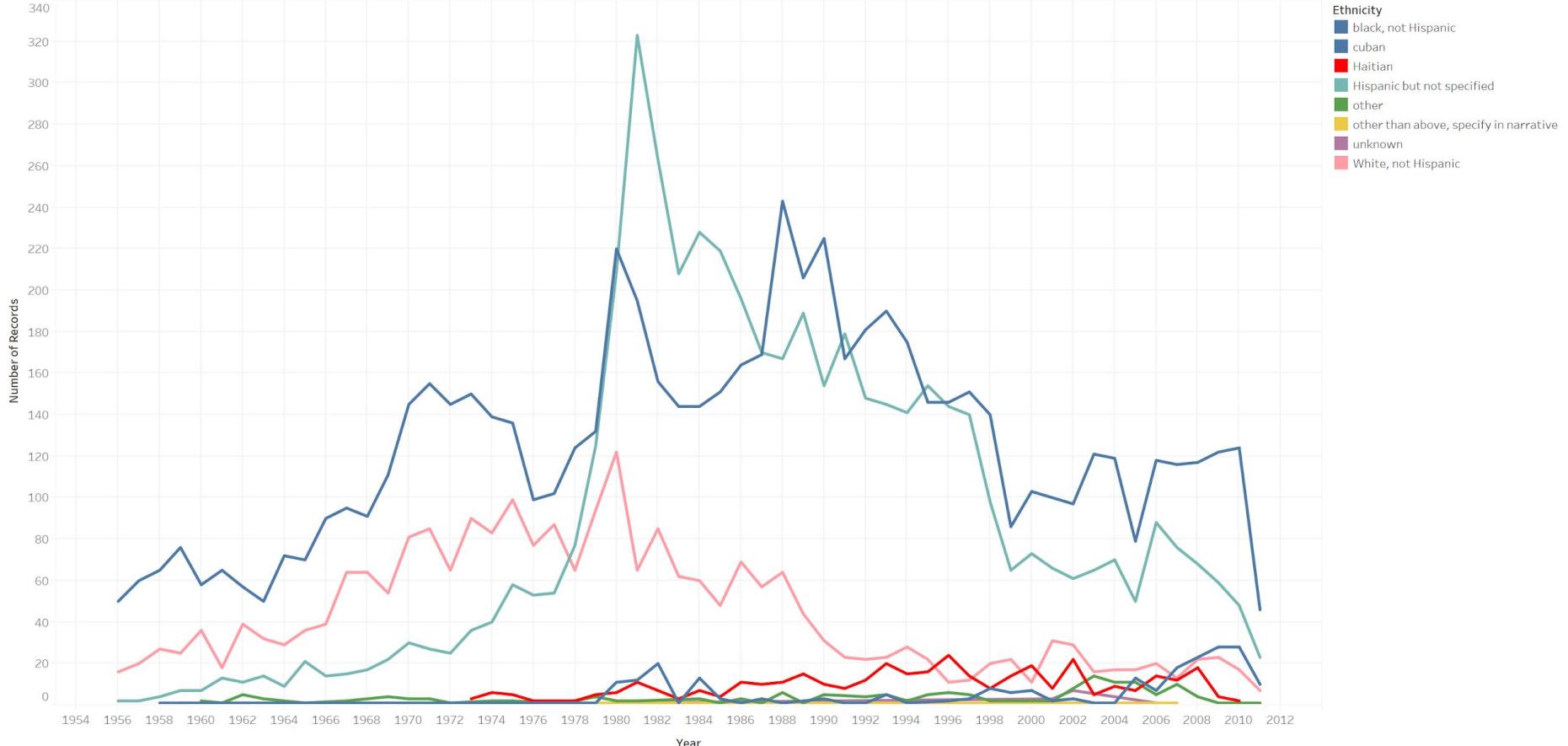
Next, we drag and drop our “Ethnicity” measure onto colors in the marks box to the left of our new graph.

Tableau will automatically set each ethnicity to a different color and redraw our graph.

We will then export the graph in the same way we exported our map.



Miami-Dade County Homicides by Ethnicity (1956-2011)

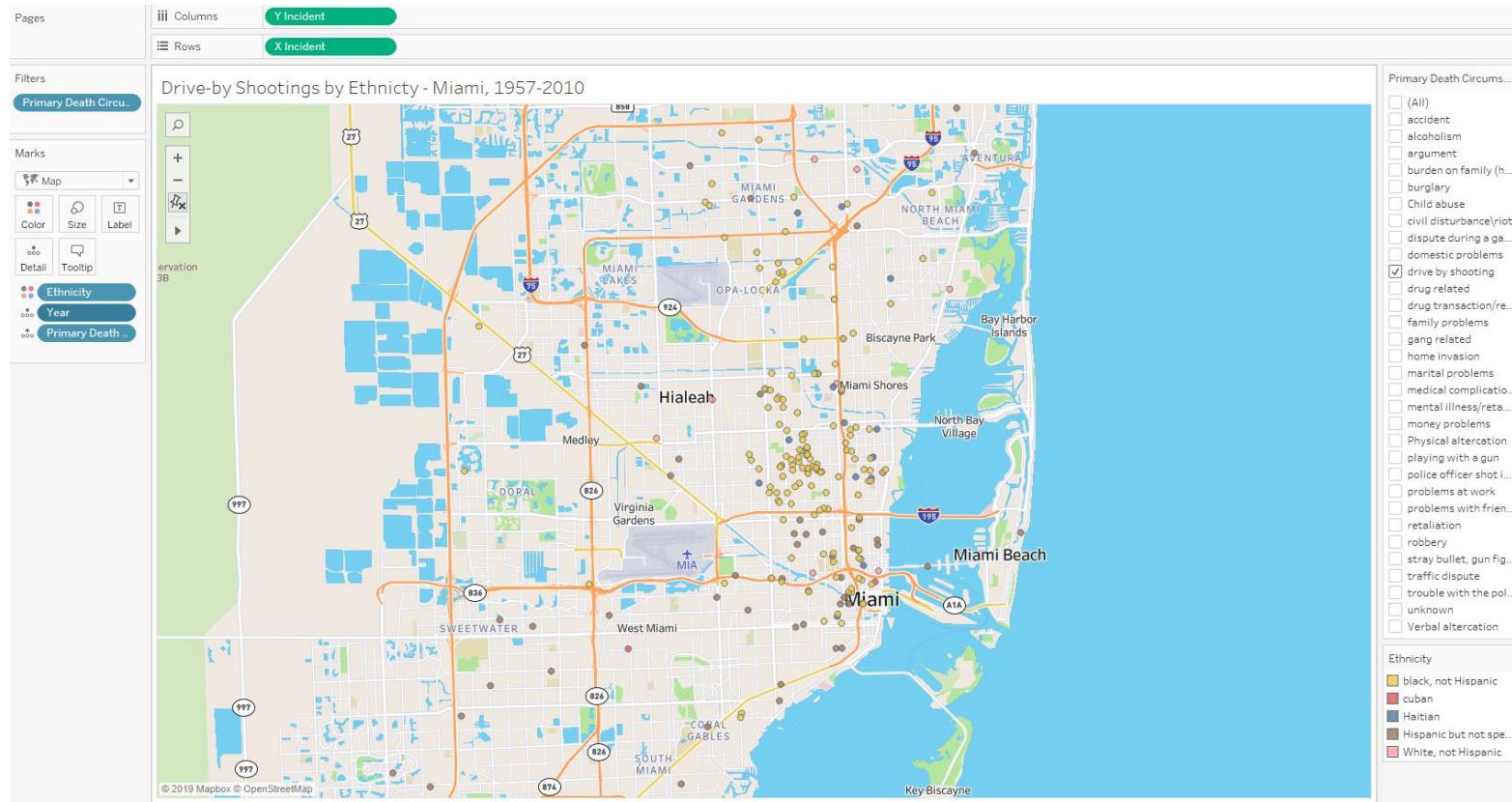


The trend of sum of Number of Records for Year. Color shows details about Ethnicity.

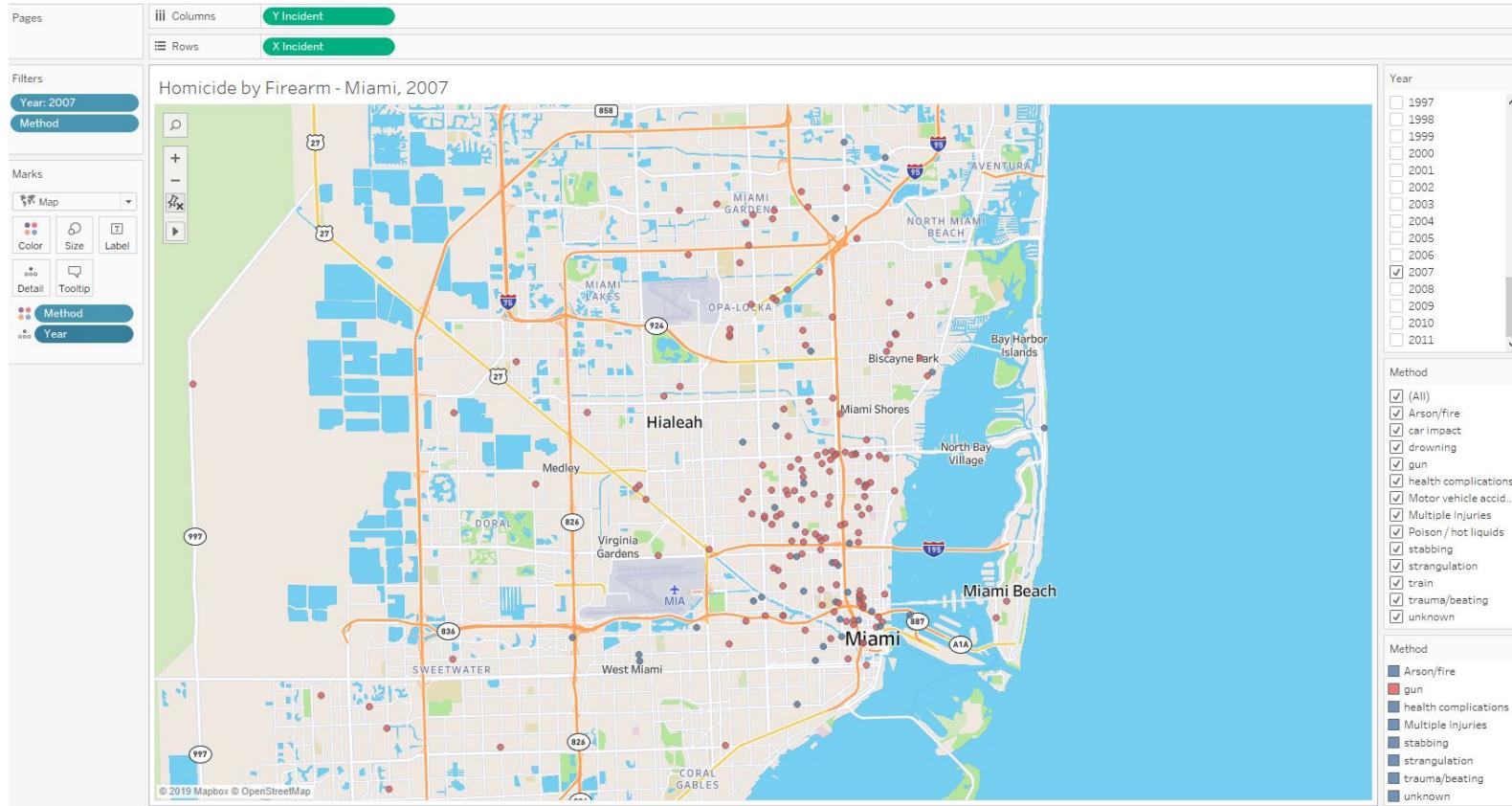
Example Research Questions

- What is the spatial relationship between gun and non-gun crimes?
- Are there any spatial patterns for homicides of people with drugs in their body at the time of the incident?
- Are there any spatial patterns of death circumstance?
- What does the homicide data say about historical events (e.g., the Mariel Boatlift of 1980)?
- What is the spatial relationship of drive-by shootings and ethnicity?

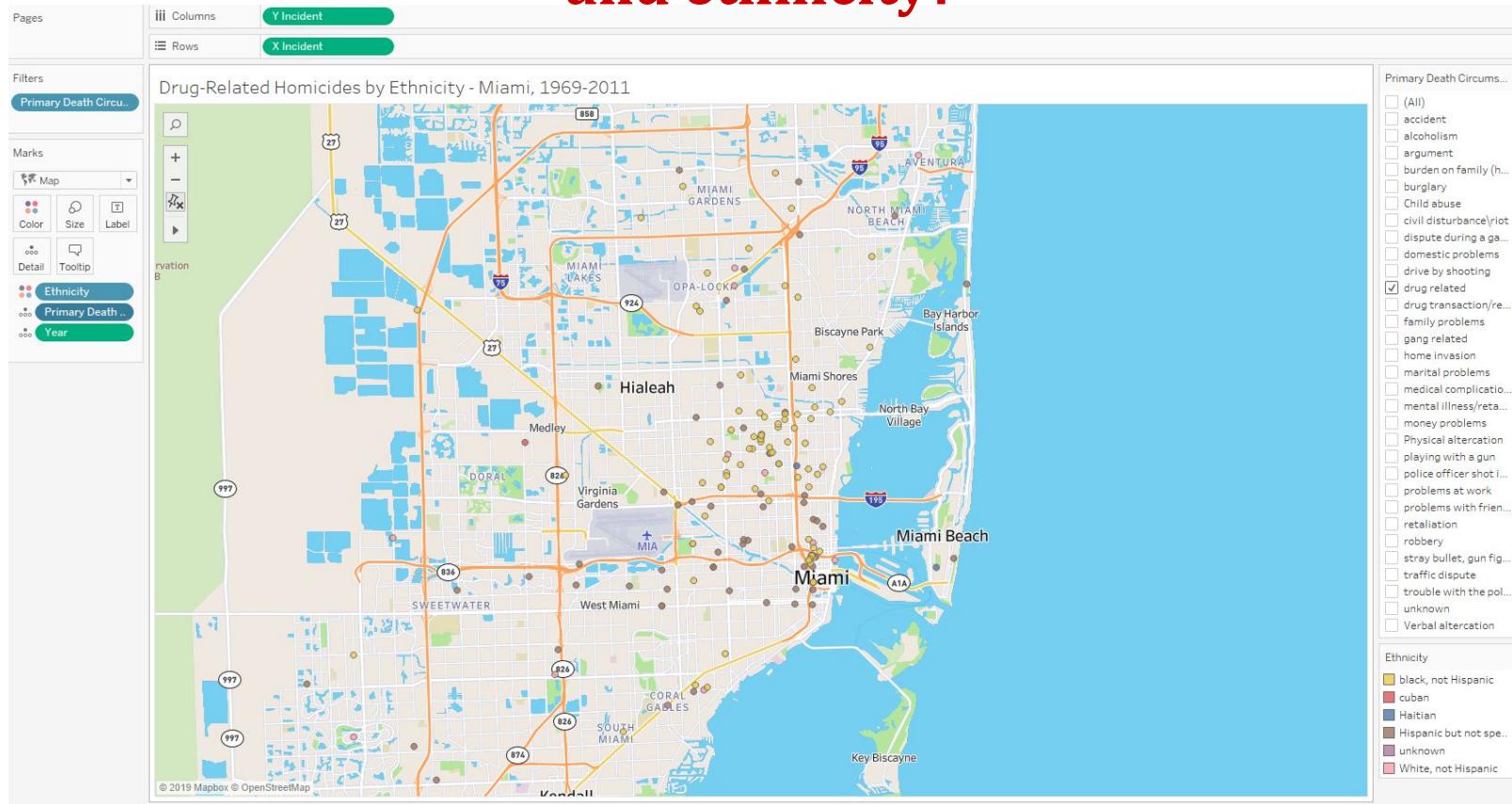
What is the spatial relationship of drive-by shootings and ethnicity?



What is the spatial relationship of firearm homicides in 2007?



What is the spatial relationship of drug-related homicides and ethnicity?



Conclusion

Tableau is a powerful tool for quickly mapping coordinate points onto a simple map. Experiment with the many different options available for filtering data and displaying data in different ways.

Tableau is also very powerful at creating a variety of charts and graphs, this can easily be done by dragging non-coordinates to the ‘column’ and ‘row’ areas.

Research questions can include a number of different dimensions and measures - do not be afraid of experimenting with different visualizations

Questions & Contact Information

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Find these slides, handouts, and more at <http://bit.ly/diti-fall2019-martinez>

DITI open office hours: Tuesdays, 1–3pm in 409 Nightingale Hall



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