Mapping with Tableau

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NULab for Texts, Maps, and Networks

Introduction

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

- Be introduced to what Tableau is.
- 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.

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

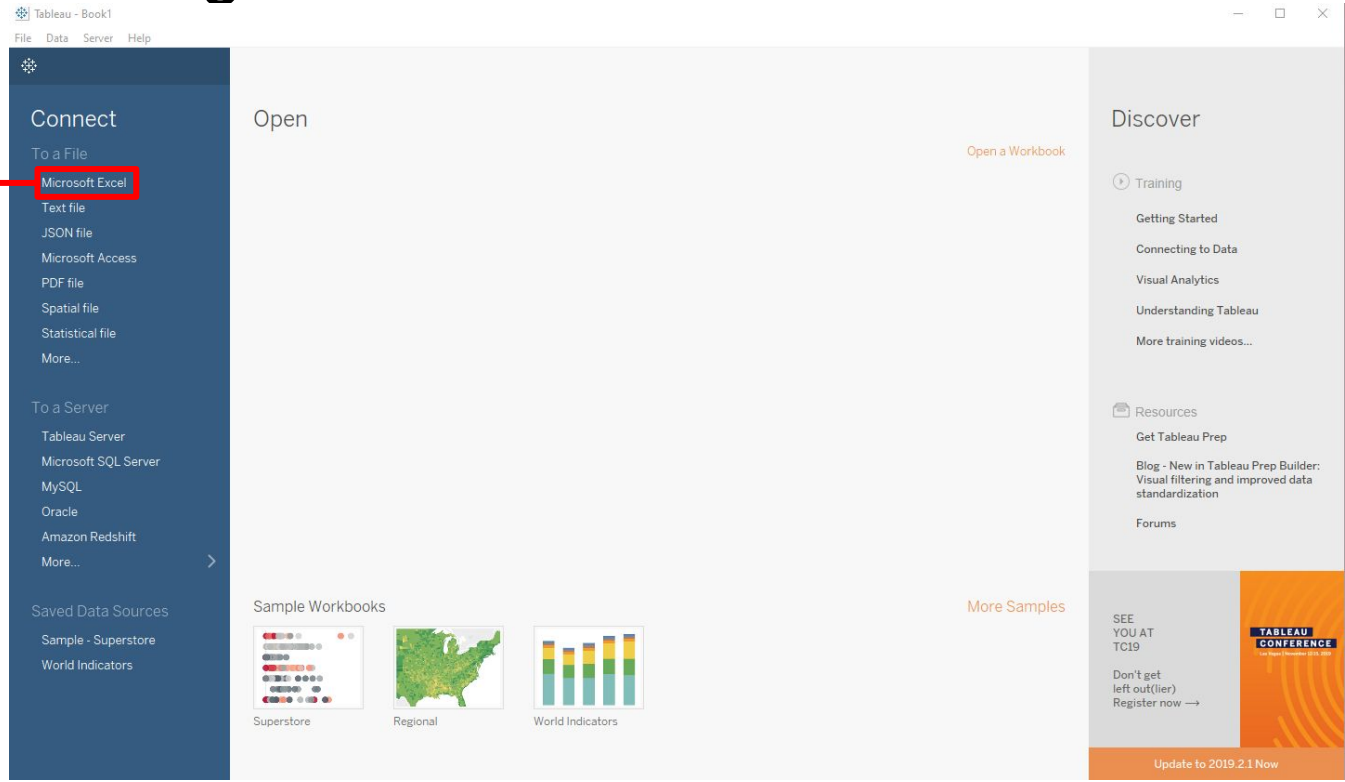
- **X/Y Coordinates**: Numerical values that allows every location on earth to be pinpointed.
    - **Latitude/Longitude:** Latitude is the north/south coordinate of a location based upon its distance from the equator. Longitude is the west/east coordinate of a location based upon its distance from the 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.



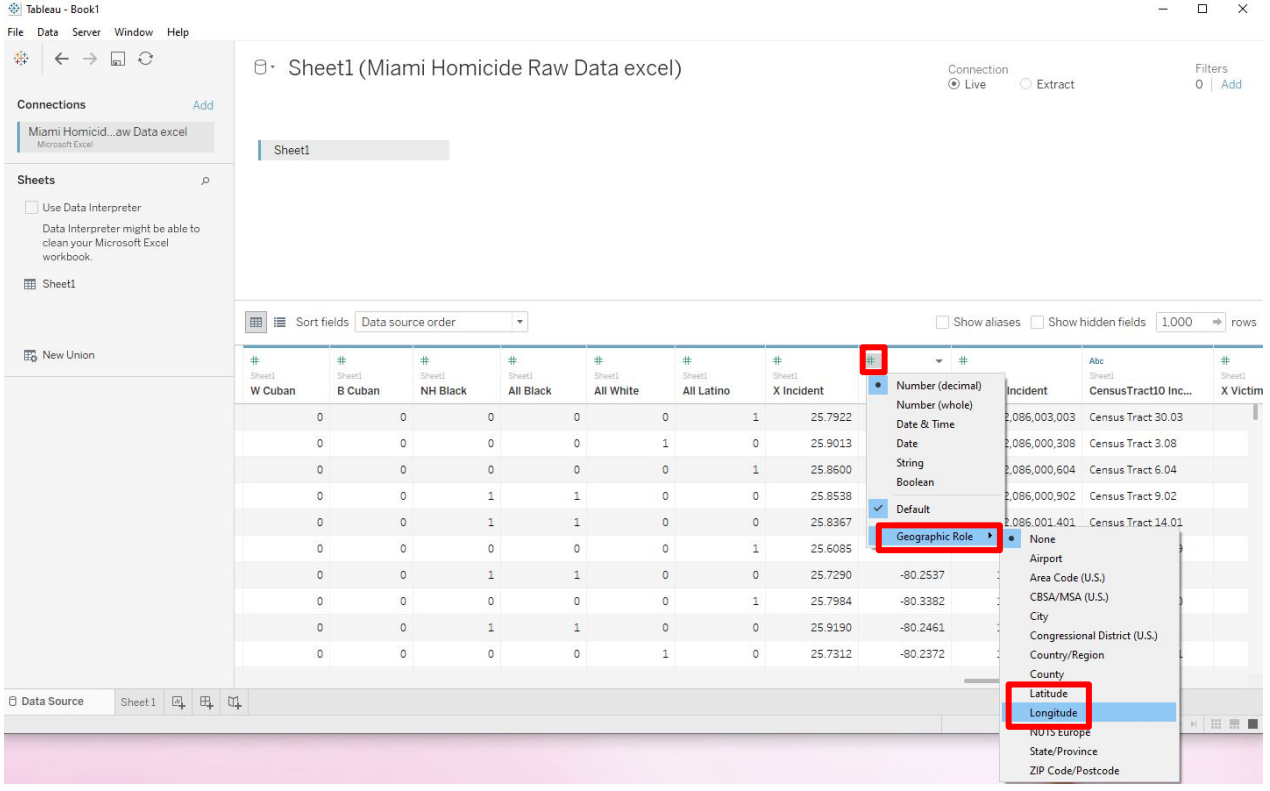
Using Tableau
Step Two: Convert Coordinate Column to Geo Data

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:

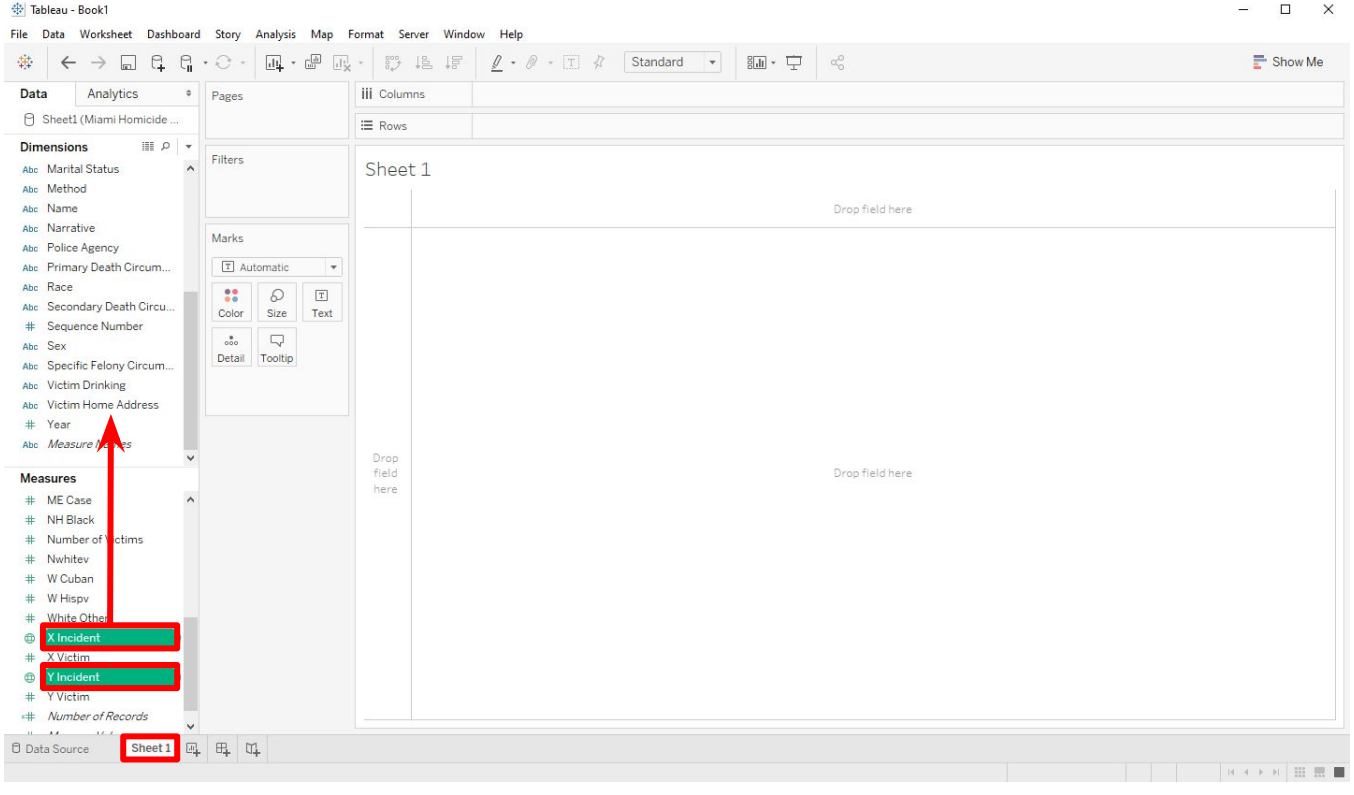
X -> Latitude
Y -> Longitude



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.

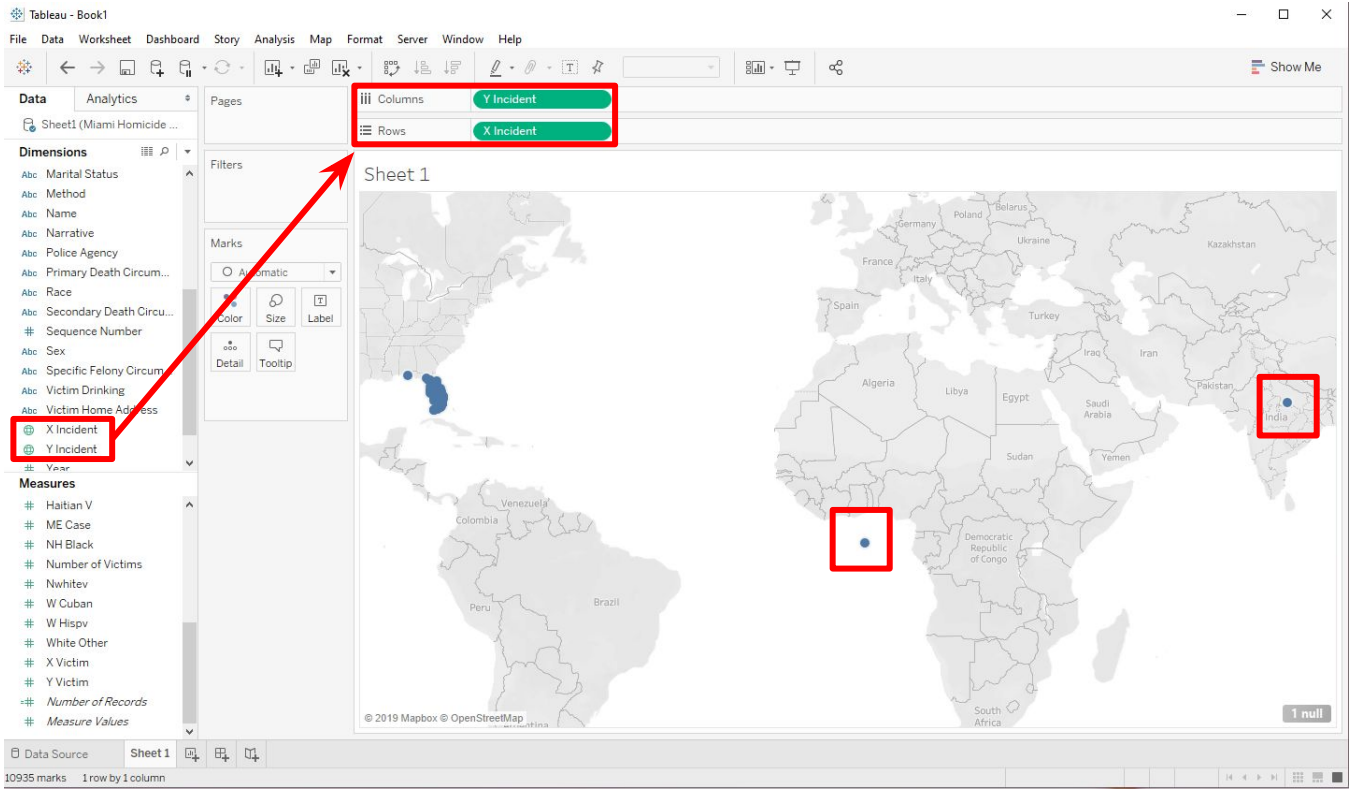


Using Tableau
Step Four: Plot our Points

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.

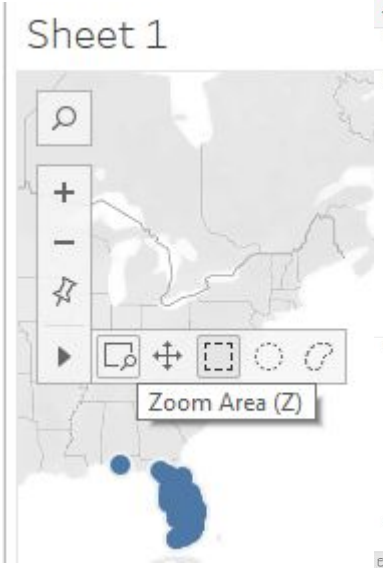
There are stray points: one off the west coast of Africa, and another in northern India. We could fix this by filtering or cleaning our data, but we will ignore this for now.

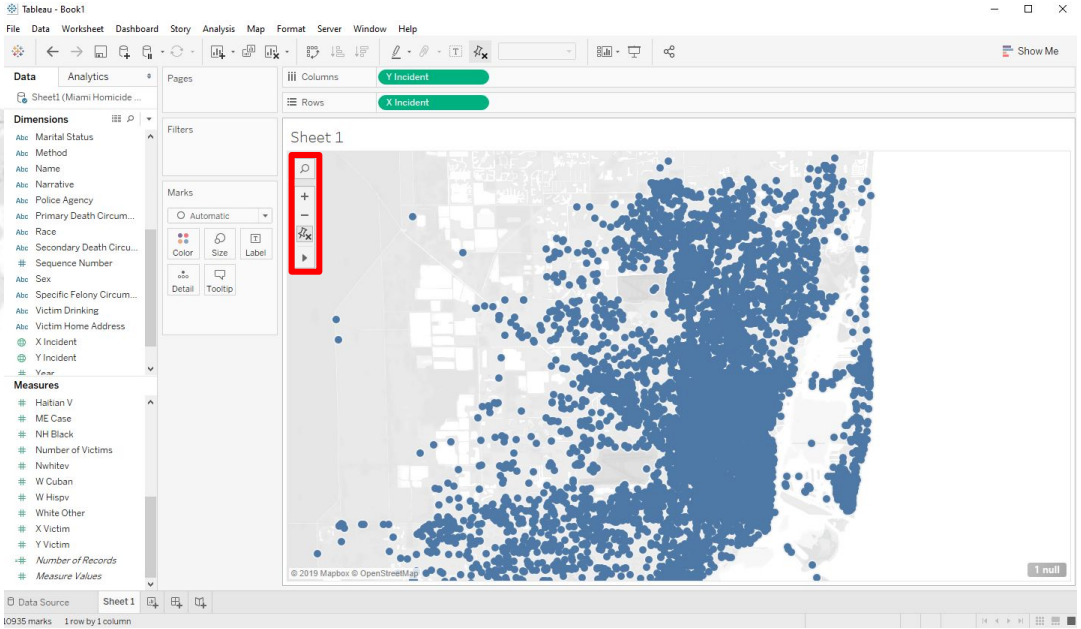


Using Tableau
Step Five: Zoom Controls

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.

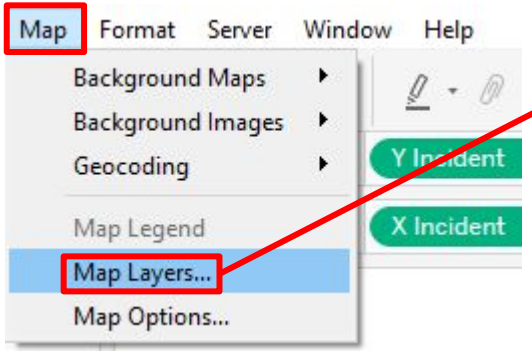


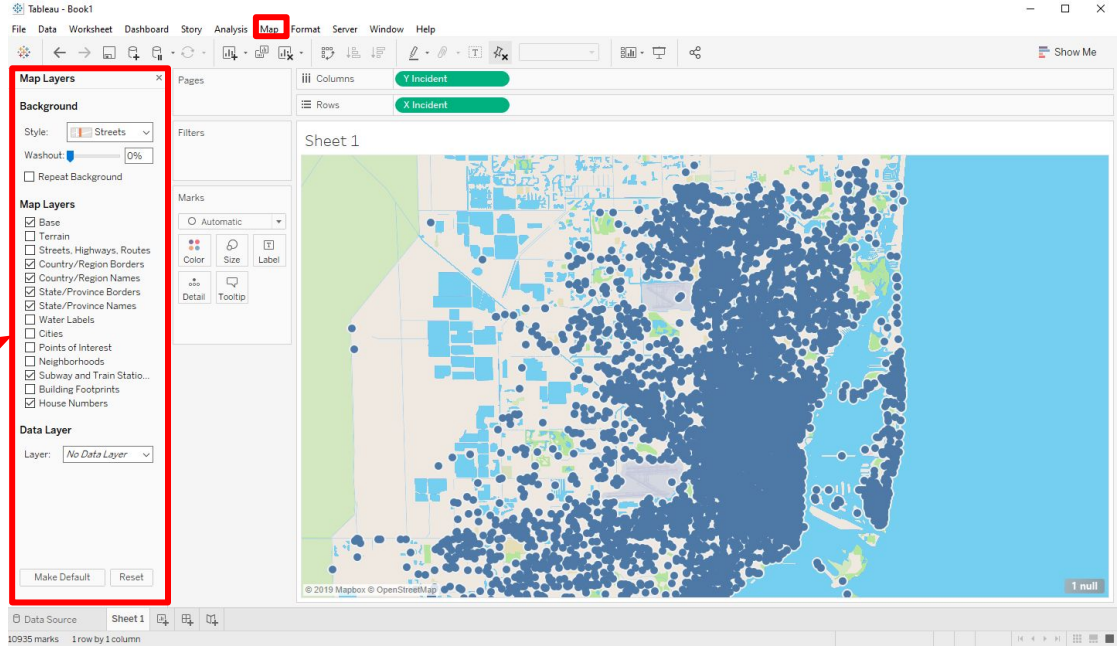


Using Tableau
Step Six: Modify Basemap

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.



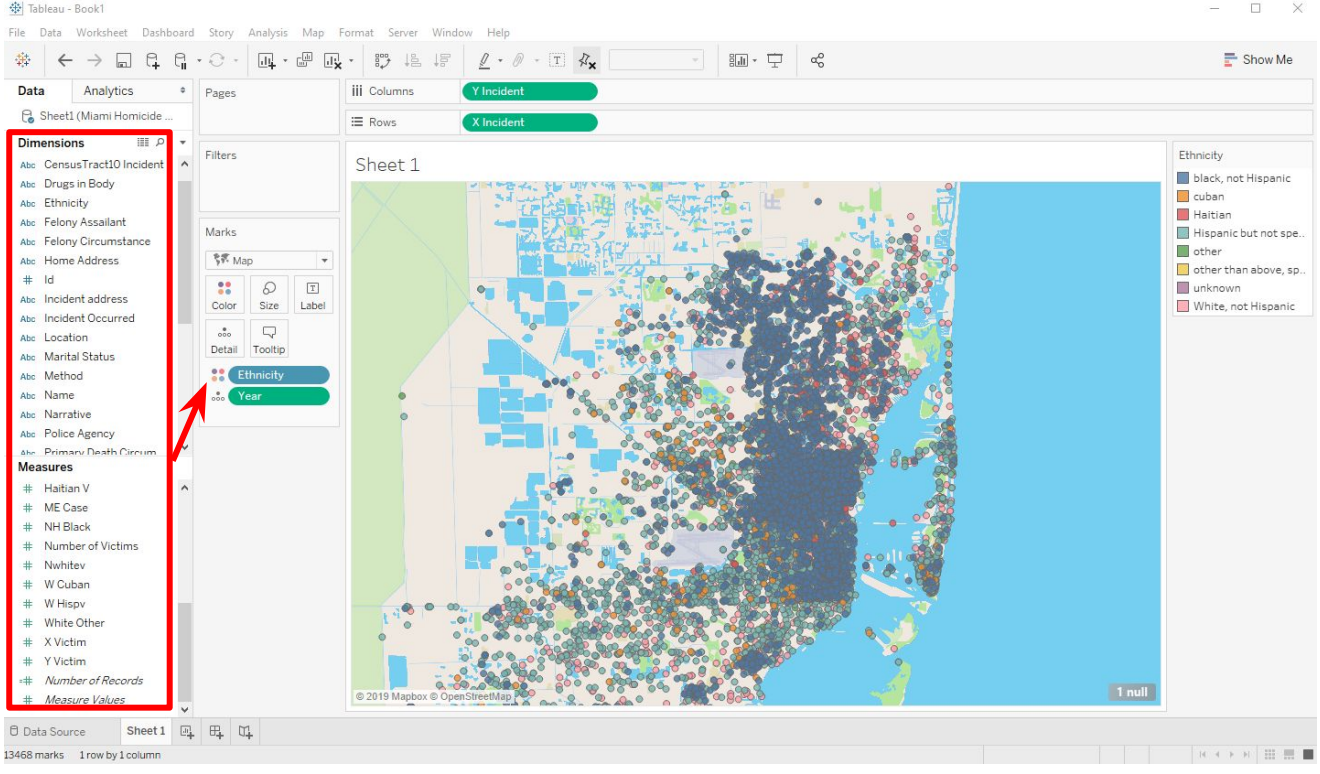


Using Tableau
Step Seven: Create Filters

To create different filters and visualization parameters, drag a dimension or measure into the ‘marks’ box.

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).



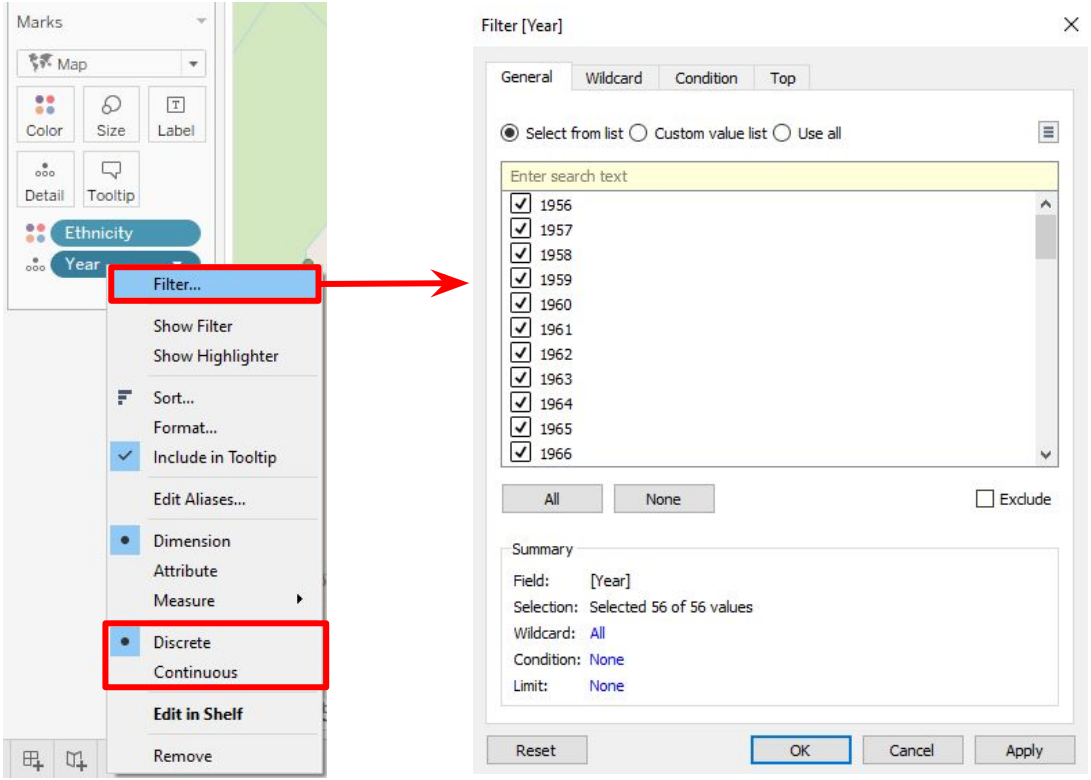
Using Tableau
Step Seven: Create Filters Continued

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

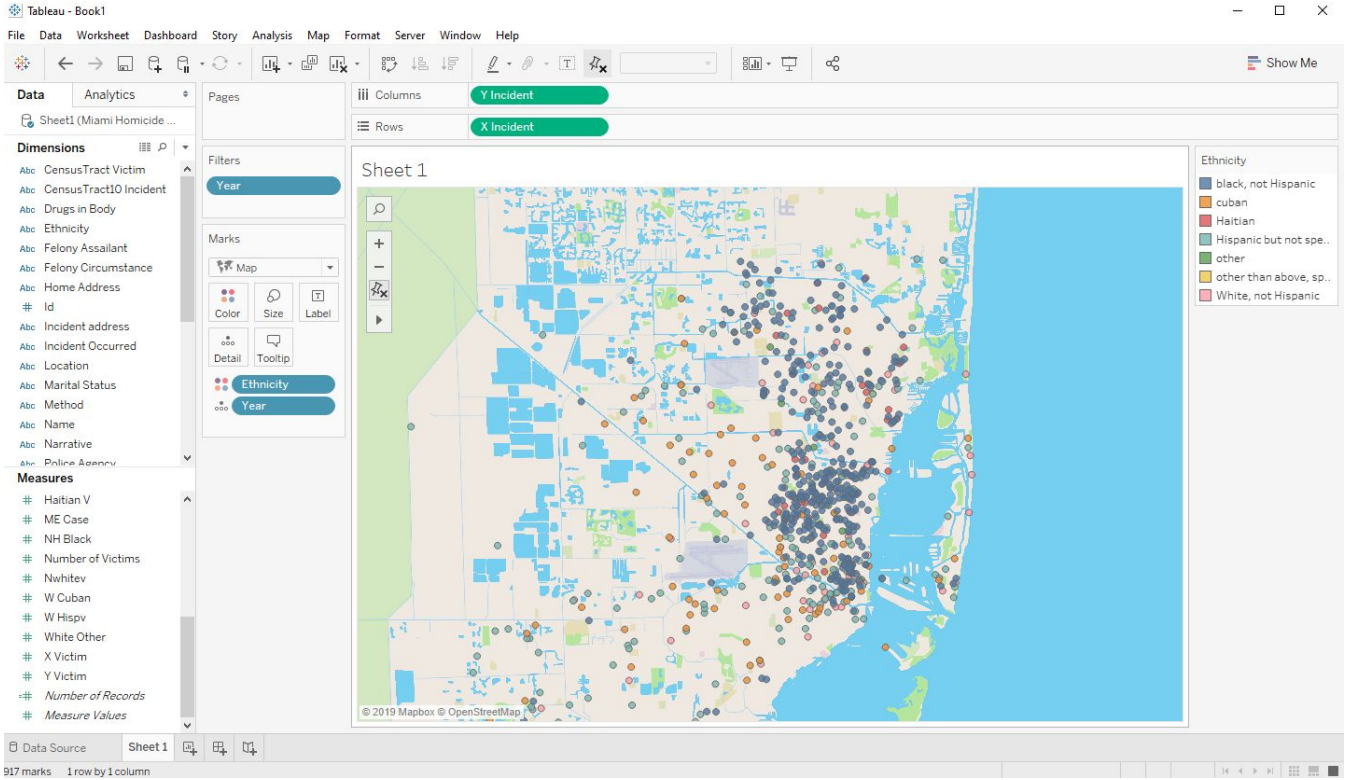
First, we converted our dates into a discrete variable.

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



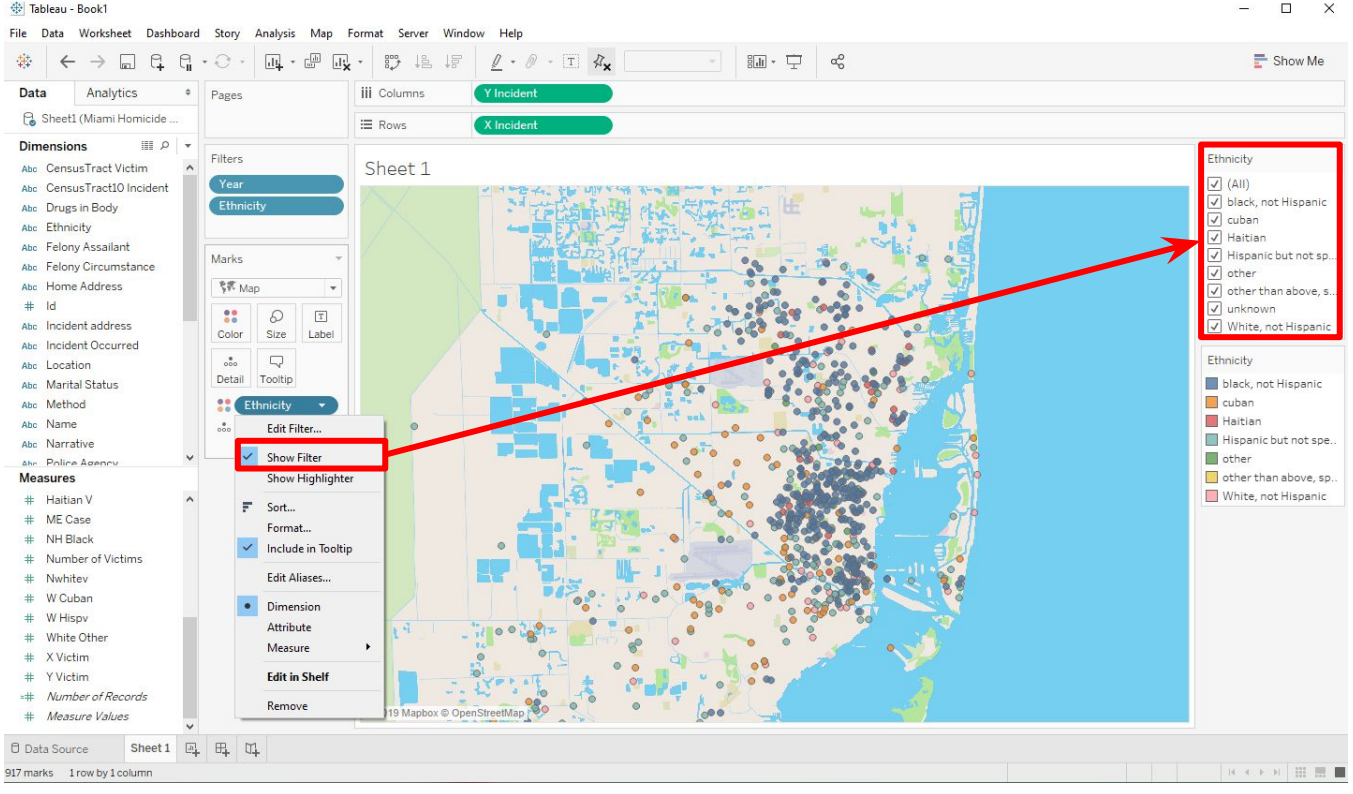
Using Tableau
Step Seven: Create Filters Continued

The next step is to filter by ethnicity.

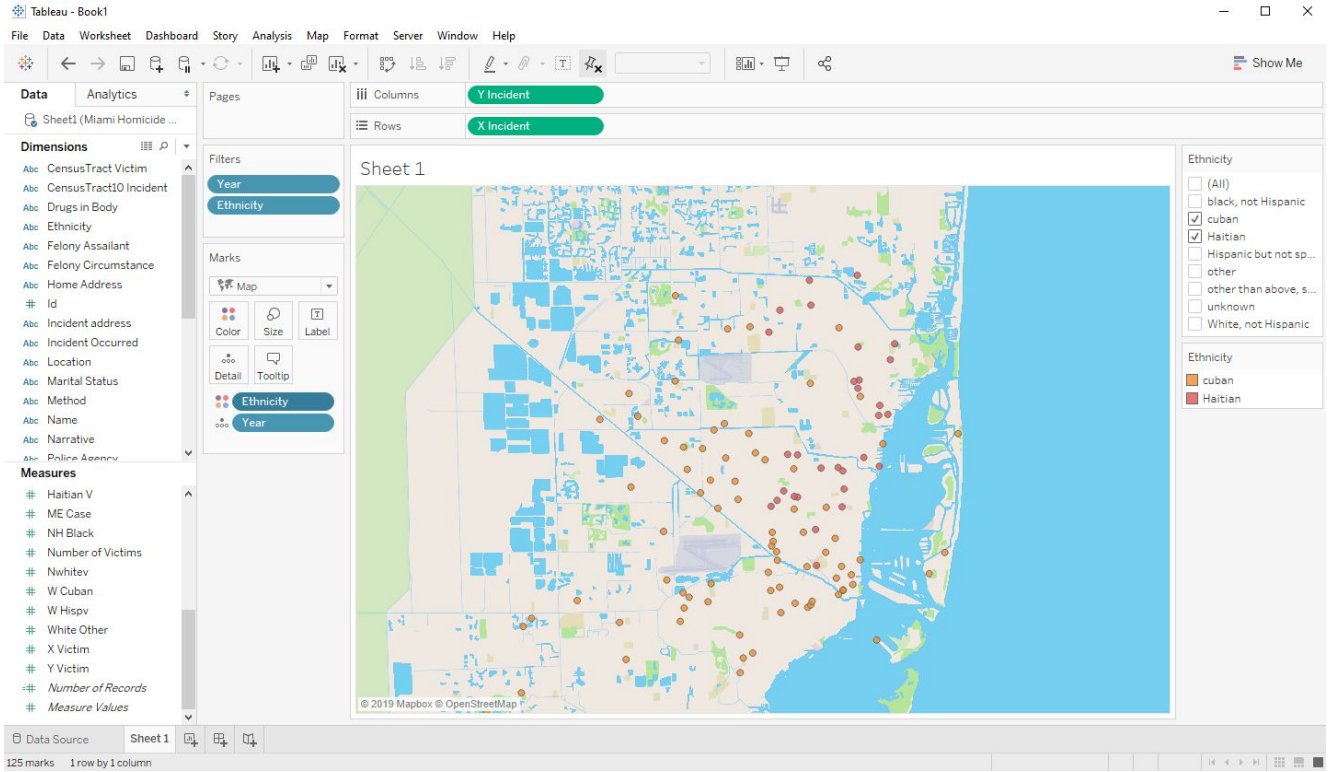
If we click on ‘ethnicity’ in the marks panel, we can then select ‘show filter.’

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

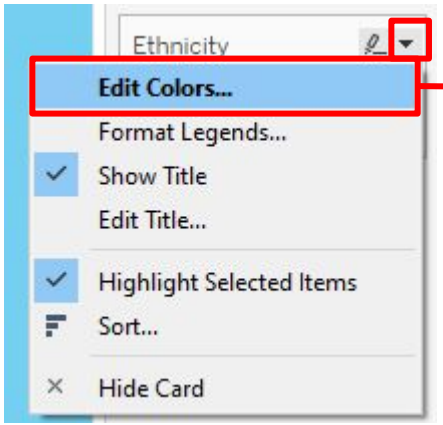


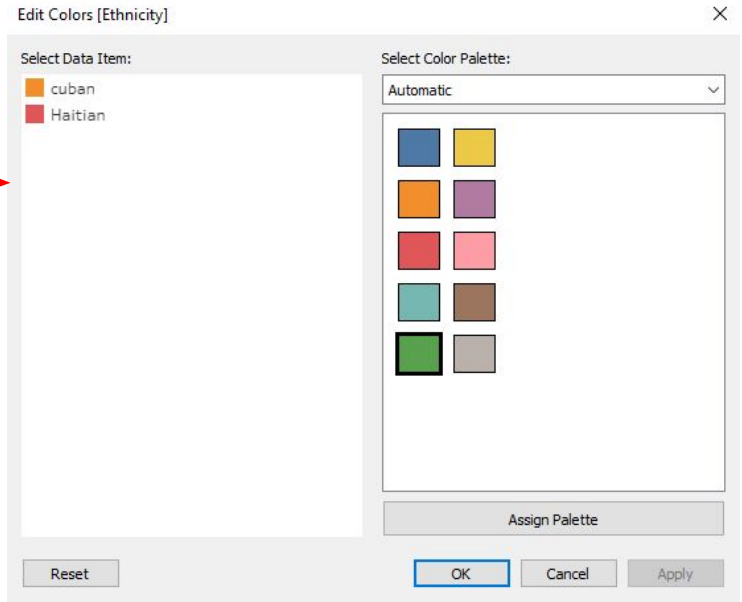
Using Tableau
Step Eight: Modify Colors

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

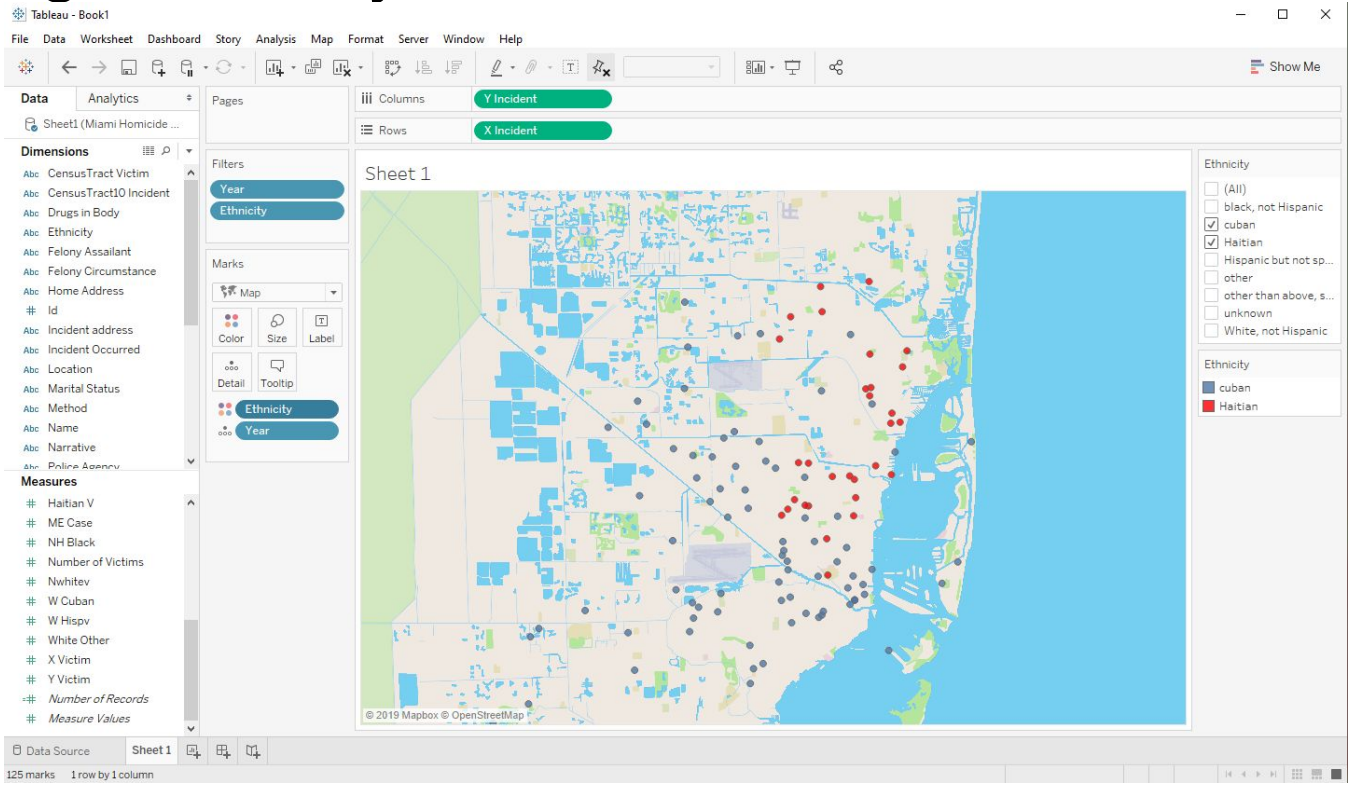
On the ethnicity sidebar, click the drop down arrow, then click on ‘edit colors…’

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





Using Tableau
Step Eight: Modify Colors Results

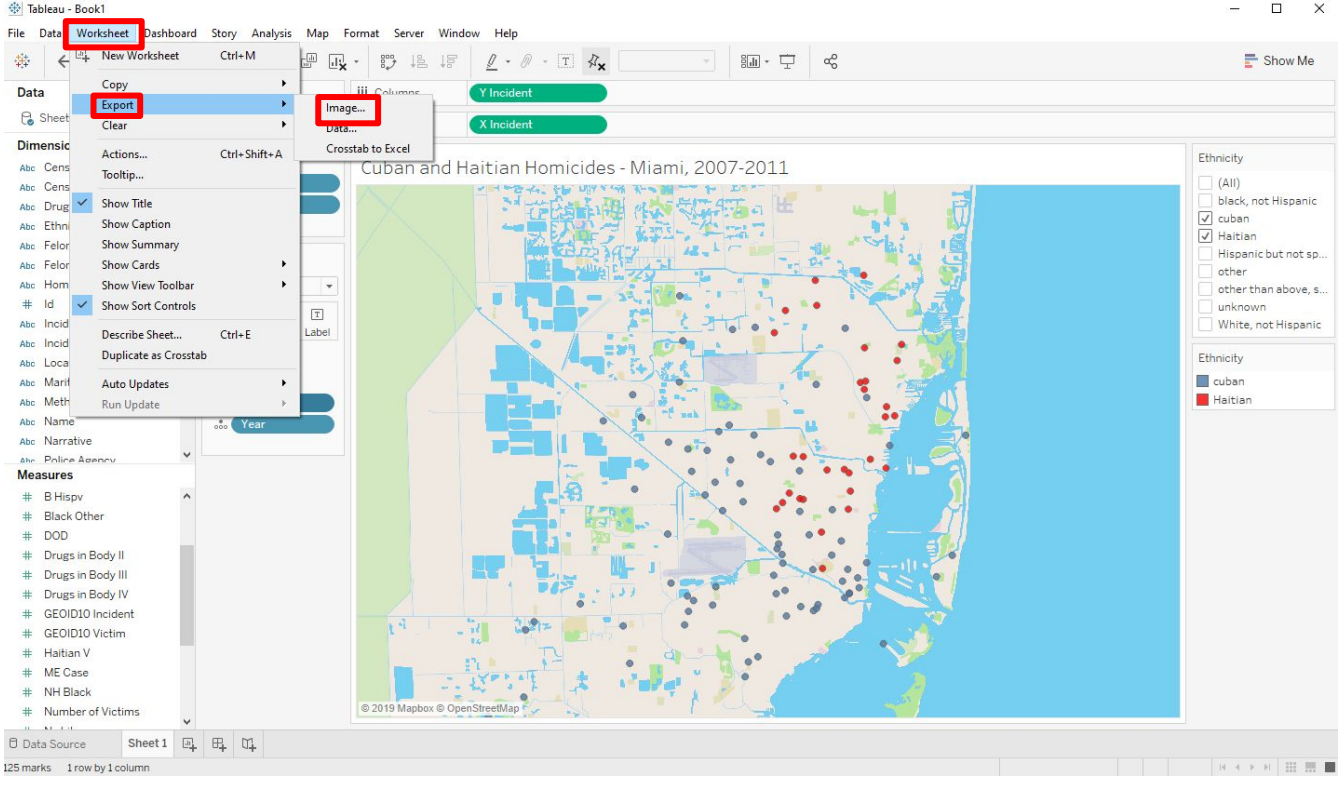


Using Tableau
Step Nine: Exporting Images

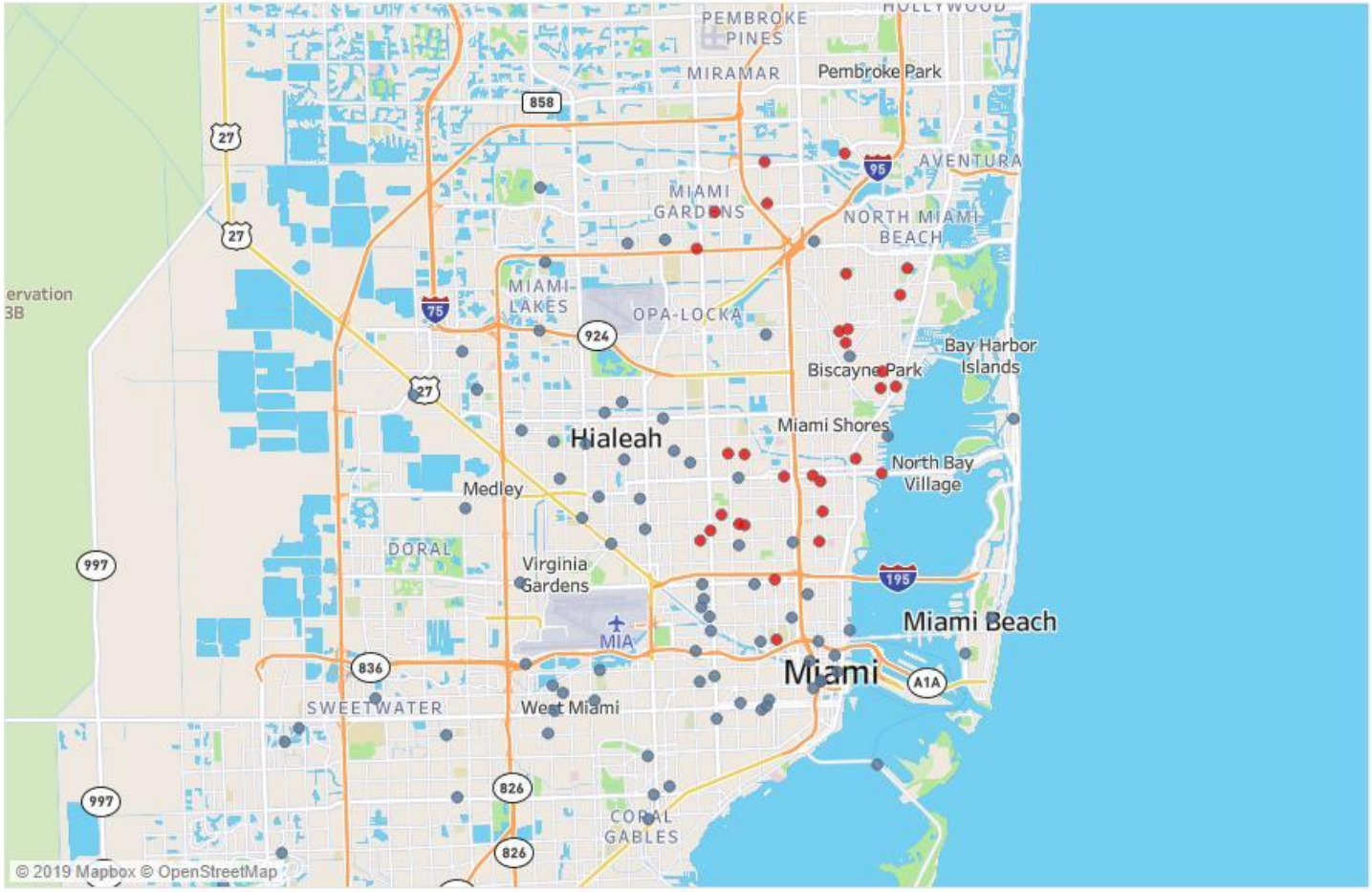
Once we are happy with our map after filtering for different data points, we can export our image.

From the ‘Worksheet’ drop-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



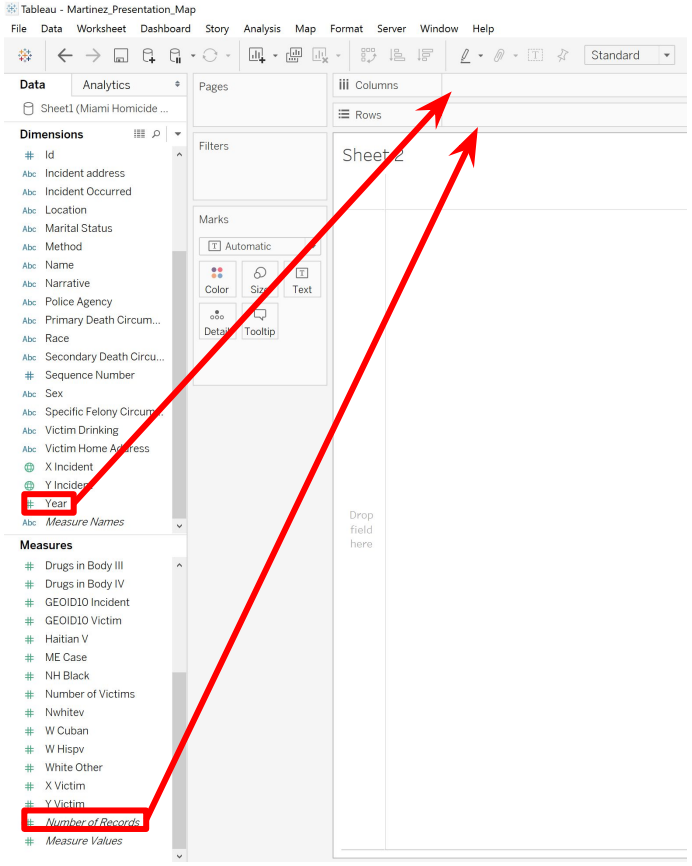
Map based on Y Incident and X Incident. Color shows details about Ethnicity. Details are shown for Year. The view is filtered on Year and Ethnicity. The Year filter keeps 2007, 2008, 2009, 2010 and 2011. The Ethnicity filter keeps cuban and Haitian.

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



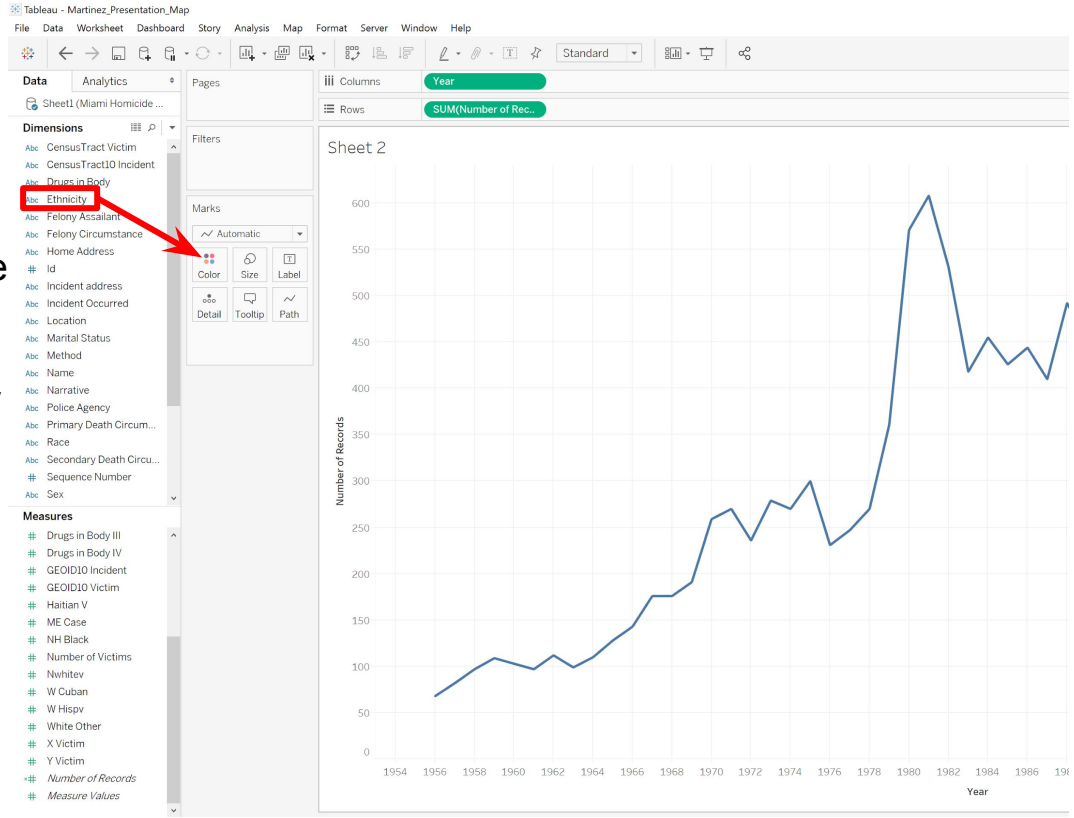
Graphs with Tableau: Drag & Drop

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

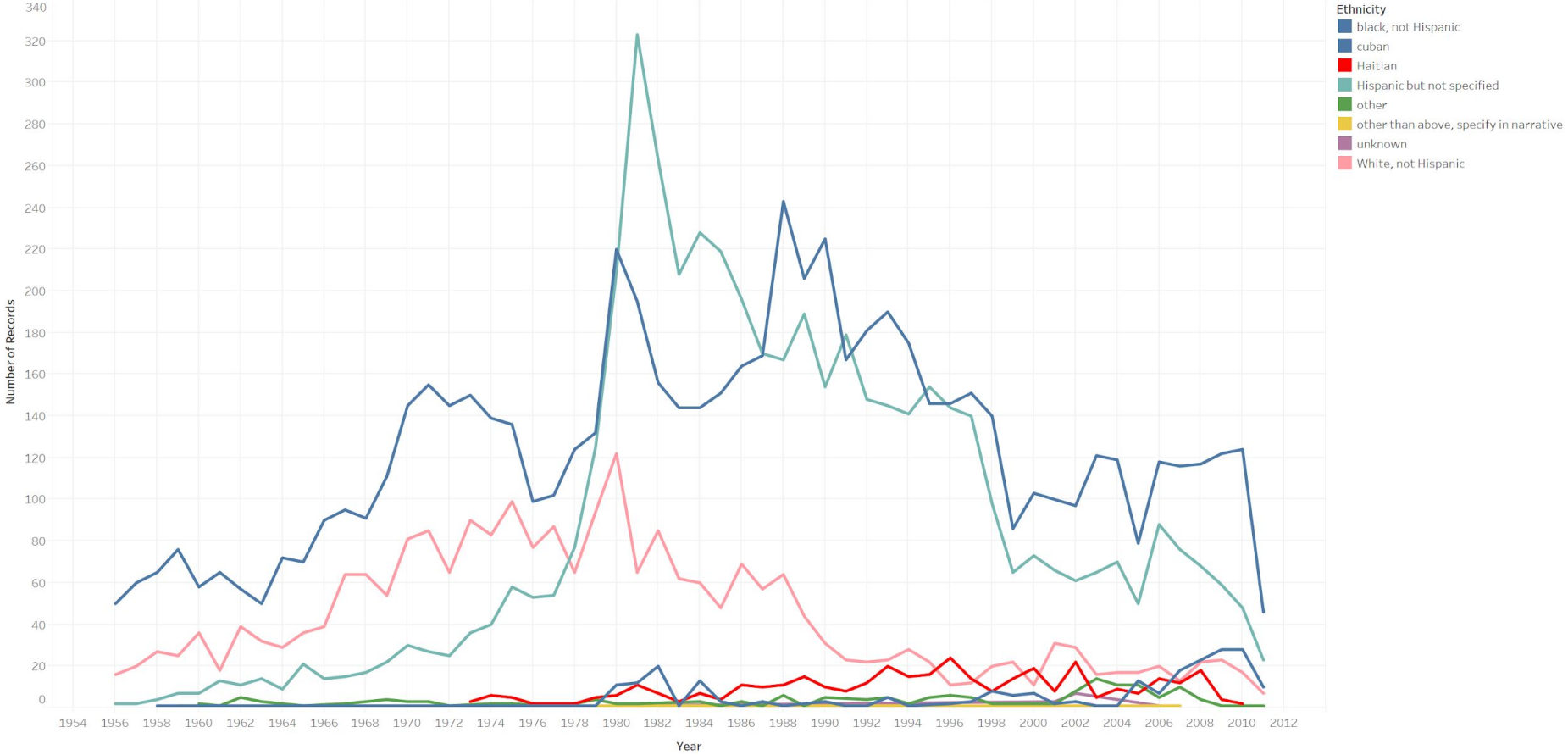
Next, we drag and drop our “Ethnicity” measure onto colors in the marks box to the left of our new graph.

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)?
- Which census tracts have the most homicides?

Pages

Columns: Y Incident

Rows: X Incident

Filters

Primary Death Circu..

Marks

Map

Color | Size | Label

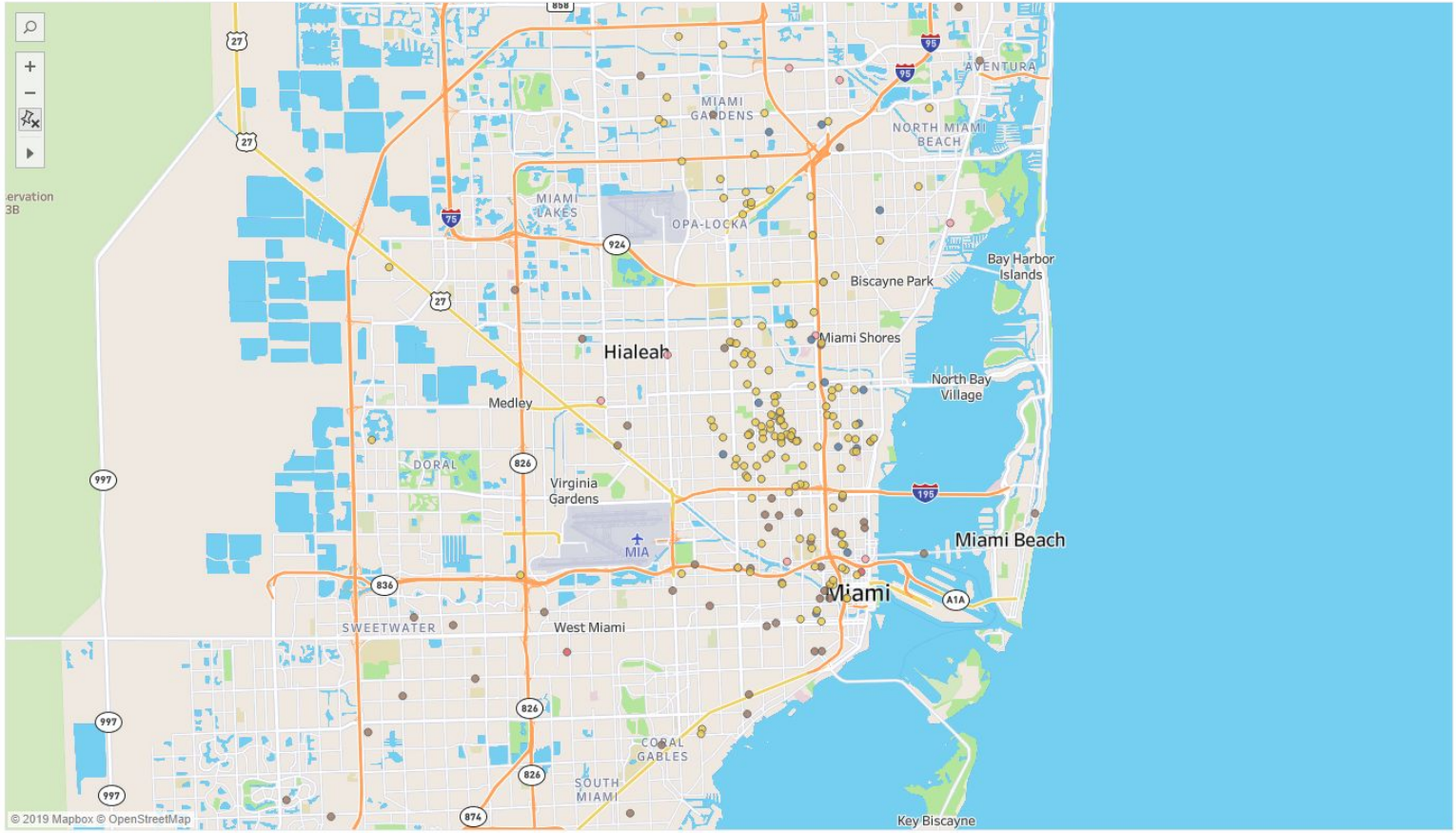
Detail | Tooltip

Ethnicity

Year

Primary Death ..

Drive-by Shootings by Ethnicity - Miami, 1957-2010



Primary Death Circums...

- [ ] (All)
- [ ] accident
- [ ] alcoholism
- [ ] argument
- [ ] burden on family (h...
- [ ] burglary
- [ ] Child abuse
- [ ] civil disturbance\riot
- [ ] dispute during a ga...
- [ ] domestic problems
- [x] drive by shooting
- [ ] drug related
- [ ] drug transaction/re...
- [ ] family problems
- [ ] gang related
- [ ] home invasion
- [ ] marital problems
- [ ] medical complicatio...
- [ ] mental illness/reta...
- [ ] money problems
- [ ] Physical altercation
- [ ] playing with a gun
- [ ] police officer shot i...
- [ ] problems at work
- [ ] problems with frien...
- [ ] retaliation
- [ ] robbery
- [ ] stray bullet, gun fig...
- [ ] traffic dispute
- [ ] trouble with the pol...
- [ ] unknown
- [ ] Verbal altercation

Ethnicity

- black, not Hispanic
- cuban
- Haitian
- Hispanic but not spe..
- White, not Hispanic

Pages

Columns: Y Incident

Rows: X Incident

Filters

Year: 2007

Method

Marks

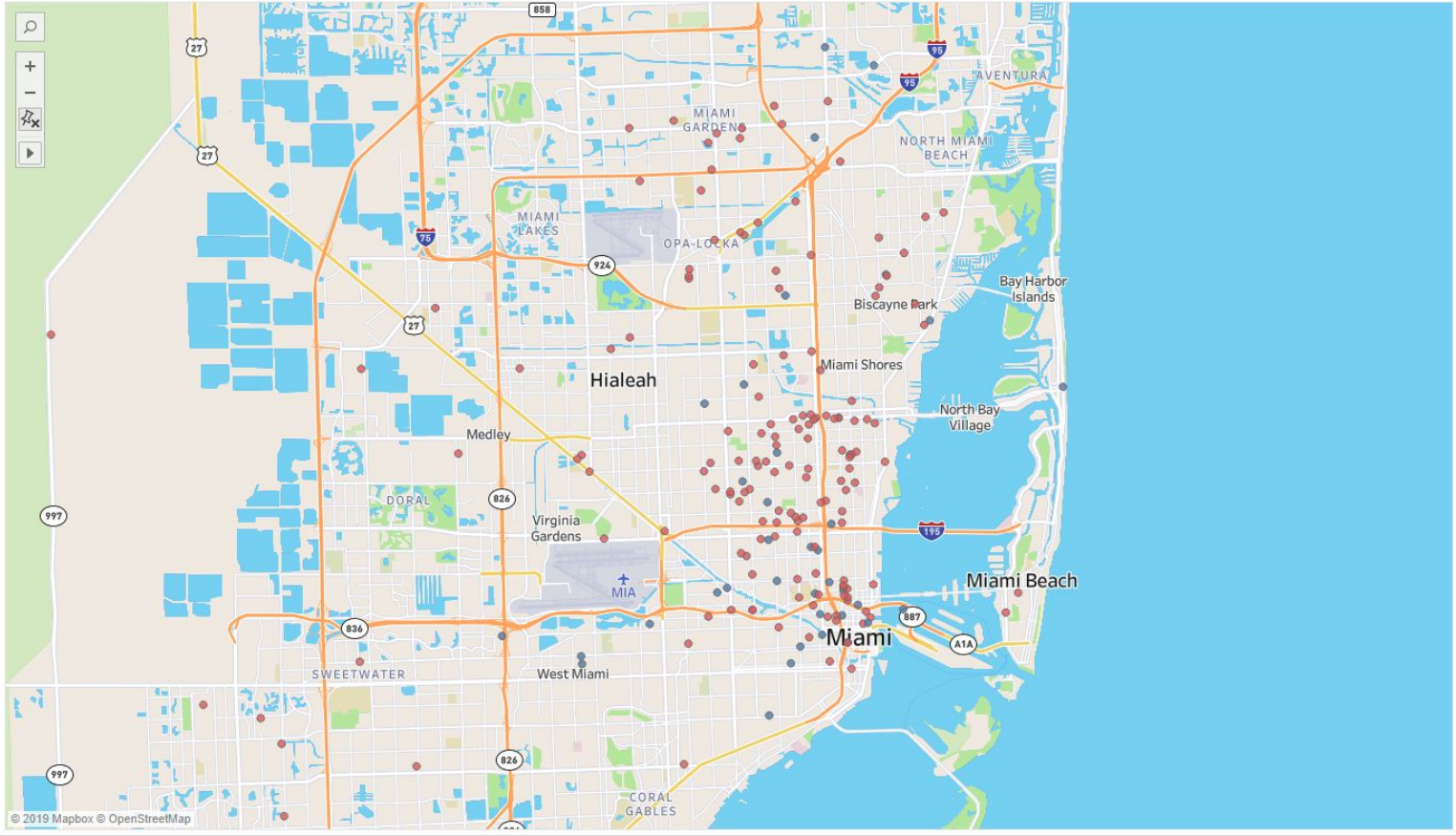
Map

Color | Size | Label | Detail | Tooltip

Method

Year

Homicide by Firearm - Miami, 2007



Year

- [ ] 1997
- [ ] 1998
- [ ] 1999
- [ ] 2000
- [ ] 2001
- [ ] 2002
- [ ] 2003
- [ ] 2004
- [ ] 2005
- [ ] 2006
- [x] 2007
- [ ] 2008
- [ ] 2009
- [ ] 2010
- [ ] 2011

Method

- [x] (All)
- [x] Arson/fire
- [x] car impact
- [x] drowning
- [x] gun
- [x] health complications
- [x] Motor vehicle accid...
- [x] Multiple Injuries
- [x] Poison / hot liquids
- [x] stabbing
- [x] strangulation
- [x] train
- [x] trauma/beating
- [x] unknown

Method

- Arson/fire
- gun
- health complications
- Multiple Injuries
- stabbing
- strangulation
- trauma/beating
- unknown

Pages

Columns: Y Incident

Rows: X Incident

Filters

Primary Death Circu..

Marks

Map

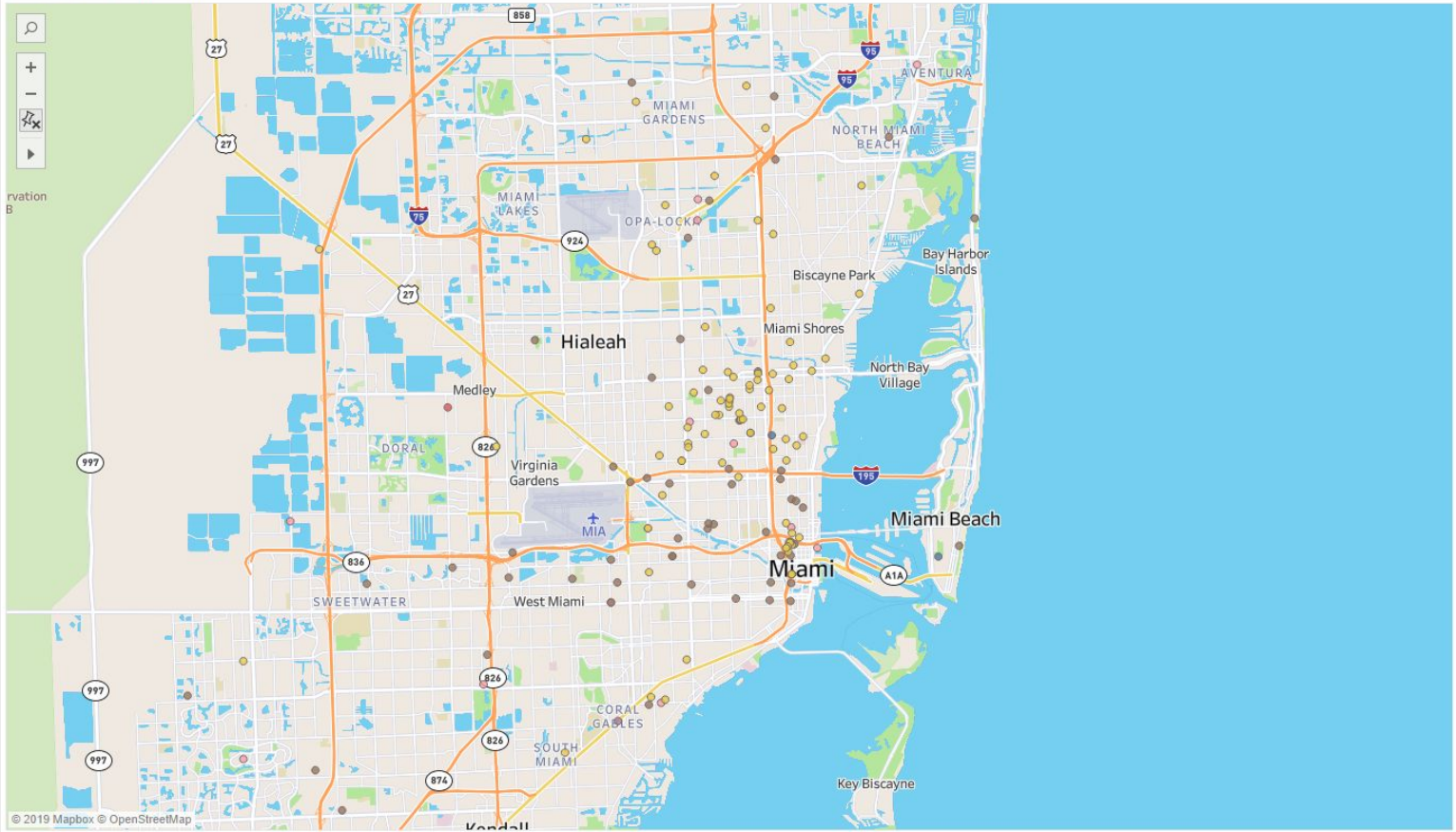
Color | Size | Label | Detail | Tooltip

Ethnicity

Primary Death ..

Year

Drug-Related Homicides by Ethnicity - Miami, 1969-2011



Primary Death Circums...

- (All)
- accident
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- trouble with the pol...
- unknown
- Verbal altercation

Ethnicity

- black, not Hispanic
- cuban
- Haitian
- Hispanic but not spe..
- unknown
- White, not Hispanic

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

For more powerful mapping software, see ArcGIS, QGIS, or CartoDB.

Questions & Contact Information

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