

Using Tableau: Advanced Mapping



MIS56 I Data Visualization
Original Author: Lusi Yang





Mapping Capability in Tableau

In our everyday lives, a map can be helpful for better understanding the world around us.

For instance, maps are often used on websites, television, or in printed media to present **demographic information**.

Static map:

e.g., a map is needed to identify what restaurant is nearby

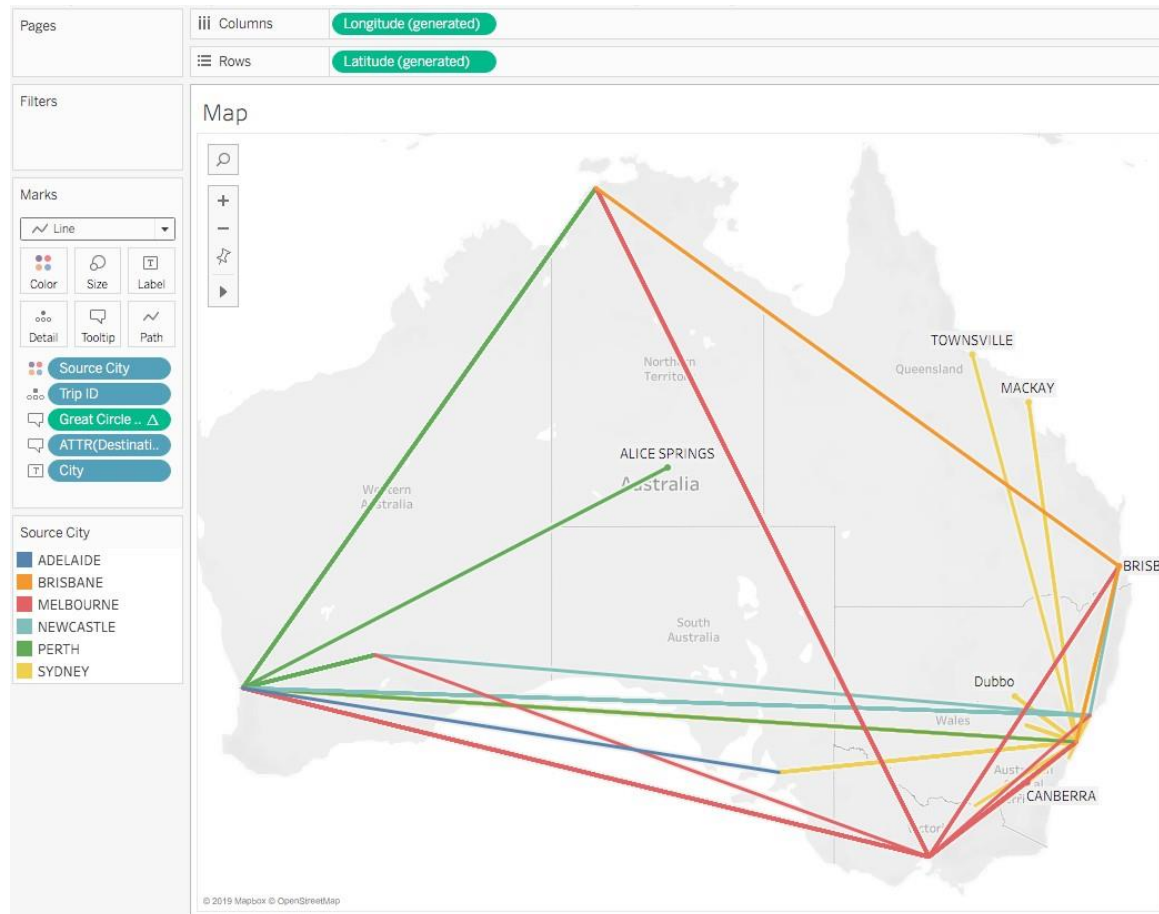
Dynamic map:

e.g., a map is needed to navigate from point A to point B



Activity I: displaying routes and calculating distances

Expected view:



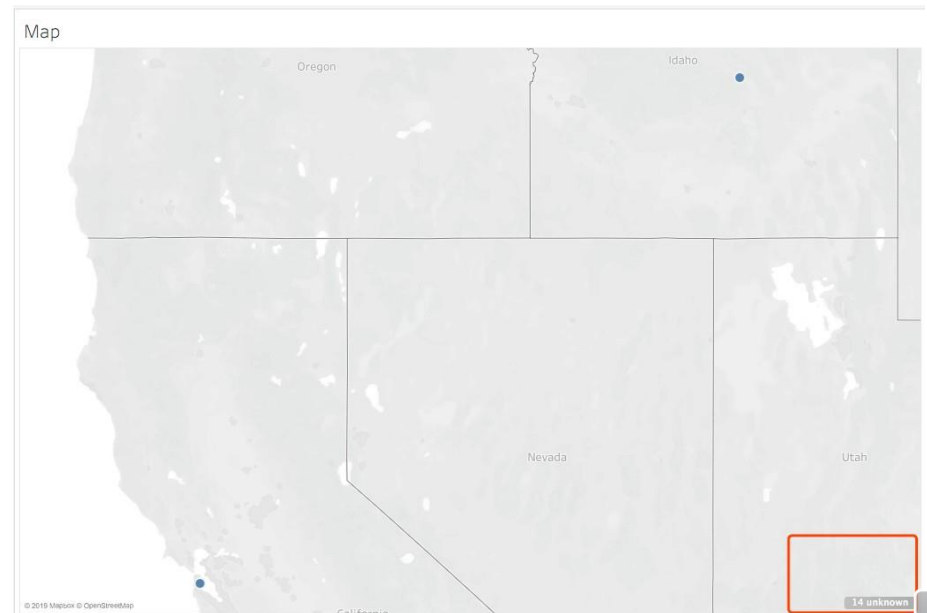


Instructions:

1. Open the workbook
2. Connect to the Transit Data data source
3. Navigate to the Map worksheet. In the Data pane and double-click on **City**, then change City from **Detail** to **Label** in the Mark-shelf.

In the following screenshot, note that the cities Mackay and Brisbane are the only cities that display.

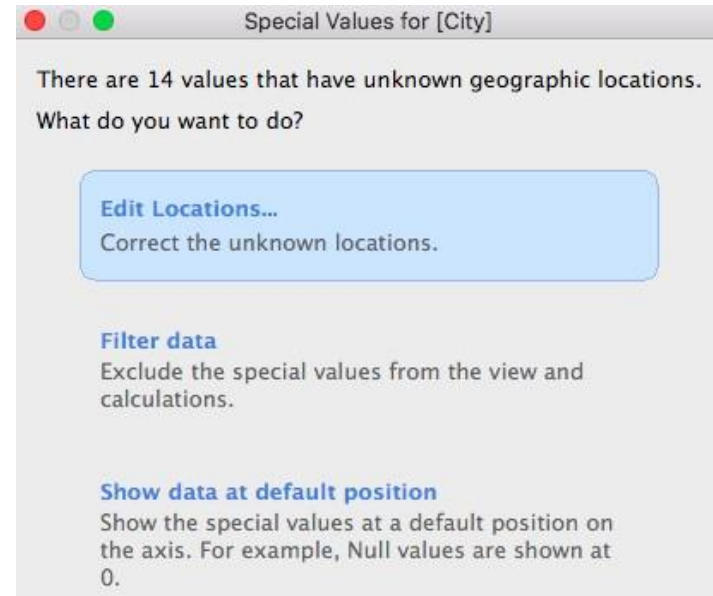
Click on **14 unknown**:





4. Select **Edit Locations...**:

5. Change the **Country/Region** to **Australia**:



Geographic roles

Country/Region:

State/Province:

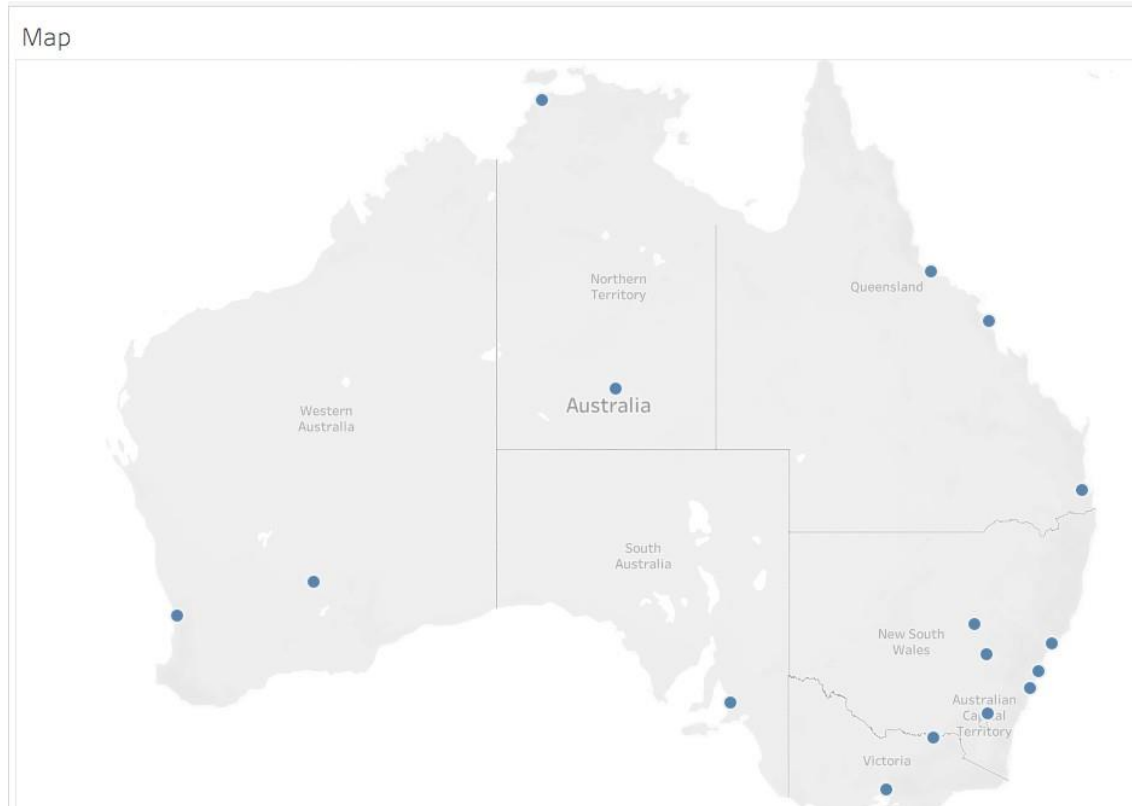
City:

Caveat: If you are in the **United States**, Melbourne in Florida will display. If you are in another country, you may get different results.





6. **Australia** is now displayed on the map:

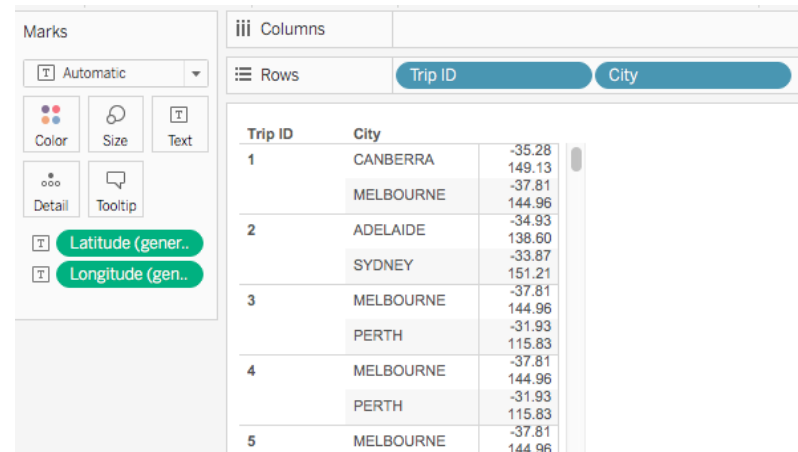


7. Navigate to the Miles worksheet and place these fields on their respective shelves, as seen in the following table:

| Field | Shelf |
|-----------------------|-------|
| Trip ID | Rows |
| City | Rows |
| Latitude (generated) | Text |
| Longitude (generated) | Text |

The screen should look like the screenshot on the right.

*Note that the cross tab is pretty cluttered. Ideally, Latitude and Longitude should display in separate columns. Unfortunately, we can't do this with the generated Latitude and Longitude because, although they are listed under the Measures portion of the **Data** pane, Tableau doesn't treat them as measures. In order to complete the exercise, we will need to be able to access the Latitude and Longitude coordinates from a separate data source.





8. Click on the Map worksheet tab.
9. Right-click on the visualization and select View Data.
10. Copy all the data in the resulting dialog box.
11. Close the dialog box and press *Control* + *v* to create a new dataset in Tableau.
12. Rename the resulting dataset **Lat Long**. Also name the worksheet Lat Long.
13. In the Lat Long worksheet, rename **Latitude (generated)** and **Longitude (generated)** to Lat and Long.





14. Return to the Miles worksheet and, within the Transit Data data source, create the calculated fields present in the following table:

| Name | Code |
|------|------------------------|
| LAT | AVG([Lat Long].[Lat]) |
| LONG | AVG([Lat Long].[Long]) |

Note that **Lat Long** is the name of dataset

15. Remove **Latitude (generated)** and **Longitude (generated)** from the **Marks View** card.

16. Place Measure Names on the **Columns** shelf and Measure Values on the **Text/Label** shelf. Now, we have the ability to treat Latitude and Longitude as true measures.

17. Remove all measures from the **Measure Values** shelf except Lat and Long.





18. Create the following calculated fields:

| Name | Code |
|-------------|------------------|
| Lookup Lat | Lookup(Lat,-1) |
| Lookup Long | Lookup(Long, -1) |

19. Place the two newly-created calculated fields on the **Measure Values** shelf.

20. Create a calculated field named Great Circle Distance Formula with the following code:

```
3959 * ACOS(  
    SIN(RADIANS([LAT])) * SIN(RADIANS([Lookup Lat])) +  
    COS(RADIANS([LAT])) * COS(RADIANS([Lookup Lat])) *  
    COS(RADIANS([Lookup Long]) - RADIANS([LONG]))  
)
```

Formula of great circle distance: https://en.wikipedia.org/wiki/Great-circle_distance





21. Place the newly-created calculated field on the **Measure Values** shelf.

22. Change the calculation of this field so that it computes using City.

23. Adjust the following calculations accordingly:

| Name | Code |
|-------------|---|
| Lookup Lat | IFNULL(LOOKUP(Lat,-1), LOOKUP(Lat,1)) |
| Lookup Long | IFNULL(LOOKUP(Long,-1), LOOKUP(Long,1)) |

24. Select the Map worksheet and set the **Marks View** card to Line.

25. Place Trip ID on the **Detail** Shelf.

26. Drag City to the bottom of the **Marks View** card.

27. Place the Great Circle Distance formula on the **Tooltip** shelf.





28. Set the Great Circle Distance formula to Compute Using City.

29. Create the following calculated fields:

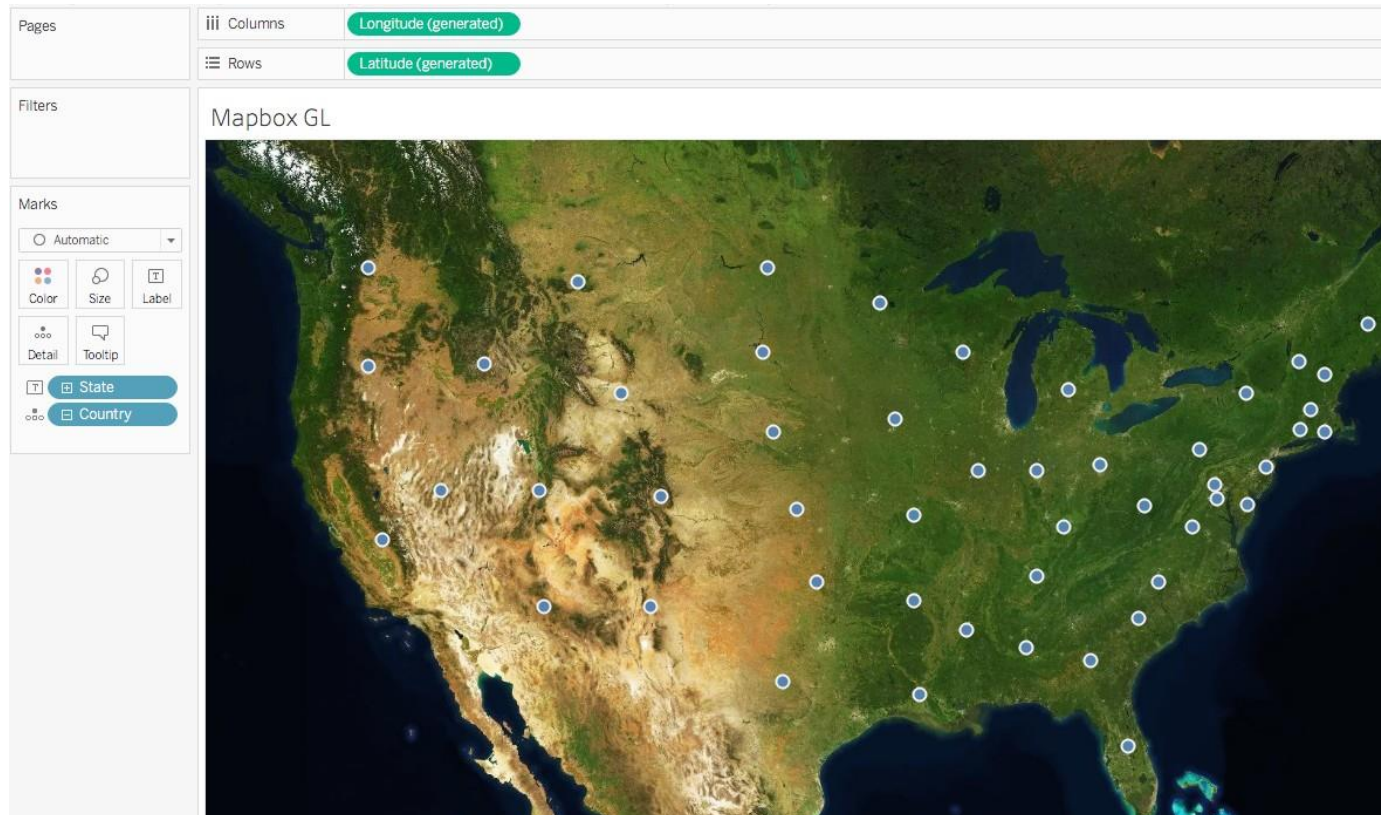
| Name | Code |
|------------------|--|
| Source City | { FIXED [Trip ID]:MIN(IF [Dest/Orig]='Source' THEN City END)} |
| Destination City | { FIXED [Trip ID]:MIN(IF [Dest/Orig]='Destination' THEN City END)} |

30. Use the newly-created calculated fields to format as desired, shown in the preceding screenshot. In particular, **Source City** is on the **Color** shelf and Destination City is used on the **Tooltip** shelf.



Activity 2: extending Tableau mapping with other technology

Expected view:



This activity will show you how to connect to Mapbox.

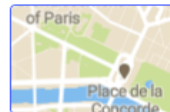




Instructions:

1. Navigate to Mapbox.com in your browser and create an account.
2. Log into Mapbox.com and click on **Create a map in Studio**
3. Select **New Style > Satellite Streets**:

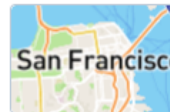
Choose a template



Basic ✓
The best way to get started.



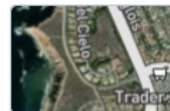
Monochrome
Start with a Monochrome style.



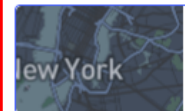
Streets
A complete basemap, perfect for incorporating your own data.



Outdoors
General basemap tailored to hiking, biking and sport.



Satellite Streets
Global imagery enhanced with road and label hierarchy.




Navigation
Light and dark basemaps tailored to in-app navigation.

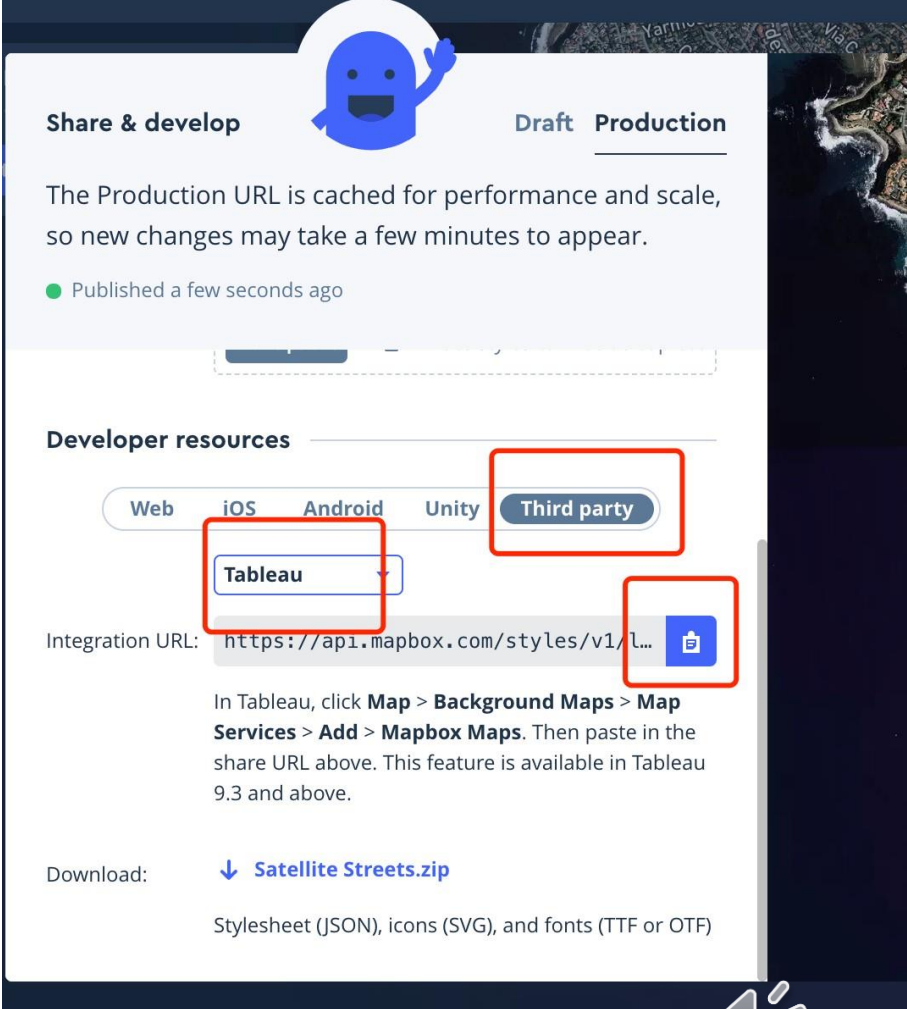


Blank
Start a style from scratch.





4. In the resulting webpage, under select **Share > Third Party > Tableau** and click the **Copy** icon:



The screenshot shows the 'Share & develop' section of a Tableau interface. At the top, there's a blue robot icon and tabs for 'Draft' and 'Production'. Below this, a message states: 'The Production URL is cached for performance and scale, so new changes may take a few minutes to appear.' A green dot indicates 'Published a few seconds ago'.

The 'Developer resources' section features a horizontal menu with tabs: 'Web', 'iOS', 'Android', 'Unity', and 'Third party'. The 'Third party' tab is highlighted with a red box. Below it, a dropdown menu is open, showing 'Tableau' as the selected option, also highlighted with a red box.

The 'Integration URL' is displayed as 'https://api.mapbox.com/styles/v1/...', with a blue 'Copy' icon to its right, highlighted with a red box. Below the URL, instructions read: 'In Tableau, click **Map > Background Maps > Map Services > Add > Mapbox Maps**. Then paste in the share URL above. This feature is available in Tableau 9.3 and above.'

At the bottom, under 'Download:', there is a link 'Satellite Streets.zip' with a download icon. Below this link, it says 'Stylesheet (JSON), icons (SVG), and fonts (TTF or OTF)'.





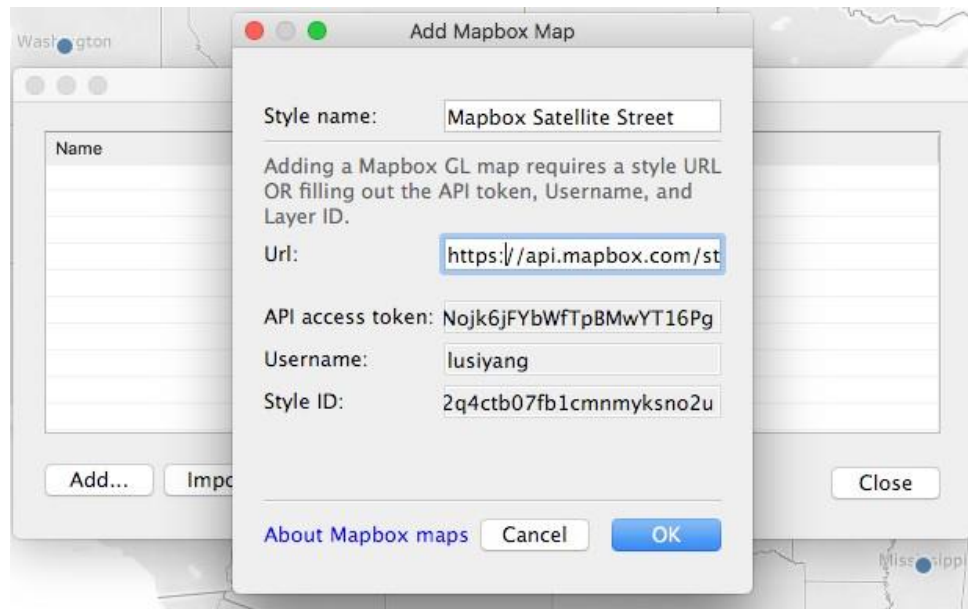
5. In Tableau, navigate to the Mapbox GL worksheet.
6. Select **Map > Background Maps > Manage Maps...** to bring up the **Map Services** dialog box.
7. Click Add and choose **Mapbox Maps**.
8. Name the map.





9. Paste in the URL that was copied from **mapbox**.

10. Tableau will fill out the remaining portion of the dialog box:



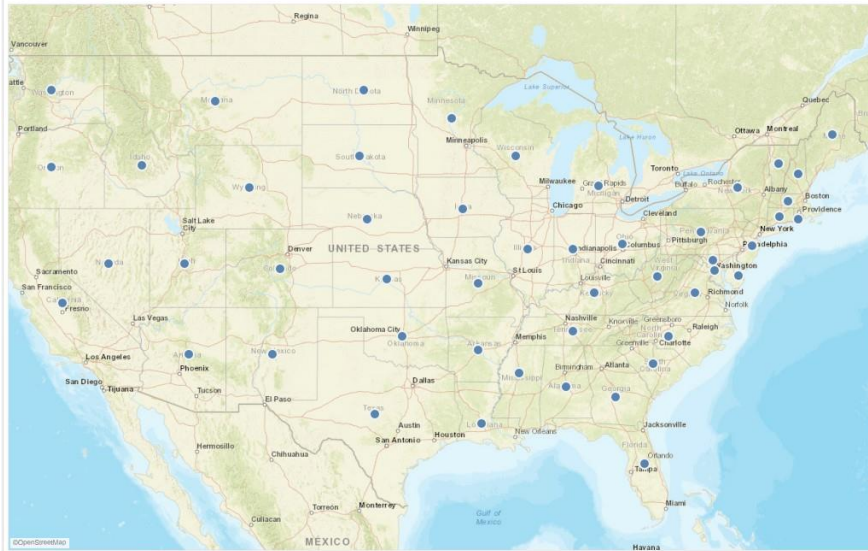
11. Close out of these dialog boxes, select the Superstore data source, and double-click on State to see the Mapbox map.



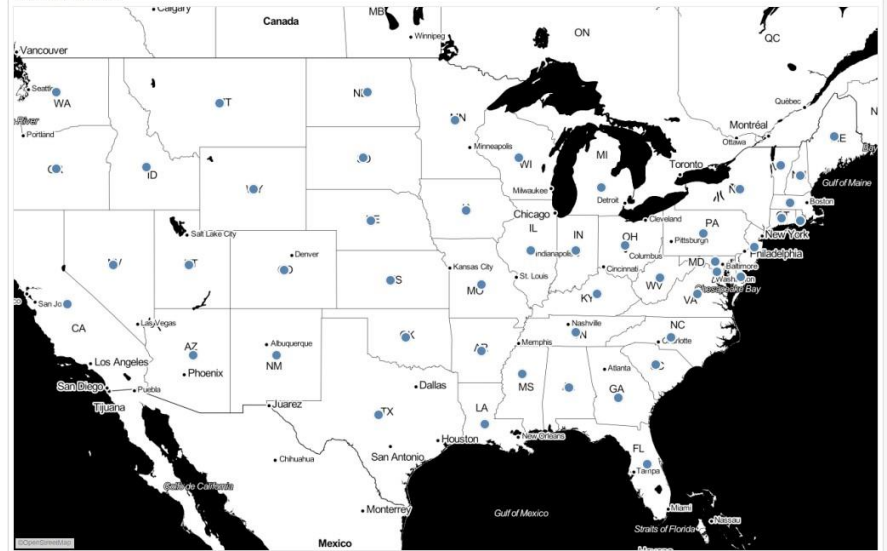
Activity 3: explore various map backgrounds by using customized TMS files

Expected view:

ArcGIS



StamenToner





TMS files

Tile Map Service (TMS) files contain XML that enables us to customize map background

By default, TMS files are located:

- **Windows**

C:\Program Files\Tableau\Tableau x.x\Mapsources

- **Mac**

/Users/username/Documents/My Tableau Repository/Mapsources

After installing Tableau Desktop, this directory is blank; however, the directory may be populated with any number of TMS files. Note that in order for a TMS file to become available after placing it in the Mapsources directory, Tableau must be restarted.





Instructions:

1. Copy the two TMS files under the *Mapsources* folder
2. Navigate to worksheet StamenToner
3. In the Superstore data, double click **State**
4. Select **Map > Background Maps > StamenToner**
5. Repeat the last two steps to create the visual in ArcGIS worksheet, by setting “ArcGIS World Street Map” as the mapping background.



Summary





What we have learnt today?

- How to extend Tableau's mapping capabilities without leaving the interface by capturing Tableau-generated latitude and longitude data, and then feed that data back into the interface through data blending.
- Various ways to extend Tableau's mapping using other technology.
- We imported our own TMS files into Tableau directory.

