

Vis Exercise 03

Introduction to Tableau II

Temporal Data, Interactive Timelines, and Parameters

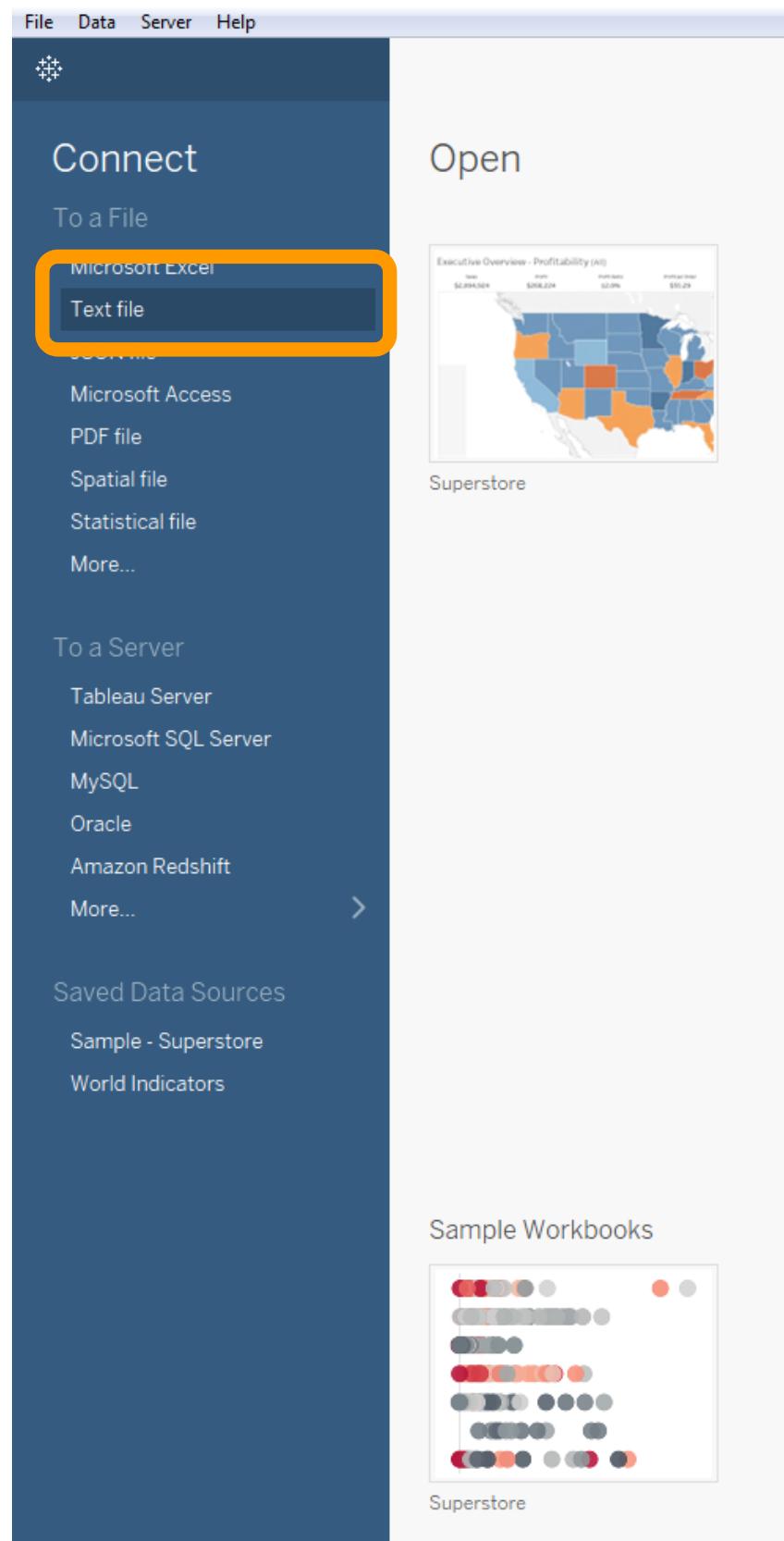
CS5044 – Information Visualization



University of
St Andrews

loading the data

- Load the migration data from StudRes/Tutorials
 - Tableau/data/migration_withCode_all_noTotal.csv
- Open Tableau and load the data as “Text File”



what we will cover

- Building a simple timeline
 - Manipulating data to work in a temporal way
- Creating an interactive slider to filter the timeline
- Working with Dashboard Actions
- Working with parameters for more interactivity

building a simple timeline

manipulating the data

- Note this data contains temporal data, but the values are in a strange format.

The screenshot shows the Tableau Data Source interface. In the top navigation bar, 'File', 'Data', 'Server', 'Window', and 'Help' are visible. Below the navigation is a toolbar with icons for refresh, back, forward, and search. The 'Connections' section shows a single entry: 'migration_wit...e_all_noTotal Text File'. The 'Files' section lists several CSV files: 'Artists_all.csv', 'HousingData.csv', 'migration_wit...l_noTotal.csv', 'MovieData.csv', 'names.csv', 'OilData.csv', 'PoliceReportData.csv', 'Songs_all.csv', and 'New Union'. A 'Sort fields' dropdown is set to 'Data source order'. The main area displays a preview of the 'migration_withCode_all_noTotal' data. The first two rows of the preview table are highlighted with a yellow box. The columns are labeled: Time, GBO, Citizen, migration_withCod..., Citizen Label, SEX, AGE, and Asyl App. The first row has 'Time' as '2011M01' and 'GBO' as 'Belgium'. The second row also has 'Time' as '2011M01' and 'GBO' as 'Belgium'. The preview table continues with data for other countries like Bulgaria, Czech Republic, Denmark, Germany, Estonia, Ireland, and Greece, along with Males/Females and Total counts for each.

Time	GBO	Citizen	migration_withCod...	Citizen Label	SEX	AGE	Asyl App
2011M01	Belgium	BE	Belgium	Males	Total	Asylum applicant	P
2011M01	Belgium	BE	Belgium	Females	Total	Asylum applicant	P
2011M01	Belgium	BG	Bulgaria	Males	Total	Asylum applicant	P
2011M01	Belgium	BG	Bulgaria	Females	Total	Asylum applicant	P
2011M01	Belgium	CZ	Czech Republic	Males	Total	Asylum applicant	P
2011M01	Belgium	CZ	Czech Republic	Females	Total	Asylum applicant	P
2011M01	Belgium	DK	Denmark	Males	Total	Asylum applicant	P
2011M01	Belgium	DK	Denmark	Females	Total	Asylum applicant	P
2011M01	Belgium	DE	Germany (until 1990 f...	Males	Total	Asylum applicant	P
2011M01	Belgium	DE	Germany (until 1990 f...	Females	Total	Asylum applicant	P
2011M01	Belgium	EE	Estonia	Males	Total	Asylum applicant	P
2011M01	Belgium	EE	Estonia	Females	Total	Asylum applicant	P
2011M01	Belgium	IE	Ireland	Males	Total	Asylum applicant	P
2011M01	Belgium	IE	Ireland	Females	Total	Asylum applicant	P
2011M01	Belgium	EL	Greece	Males	Total	Asylum applicant	P
2011M01	Belgium	EL	Greece	Females	Total	Asylum applicant	P

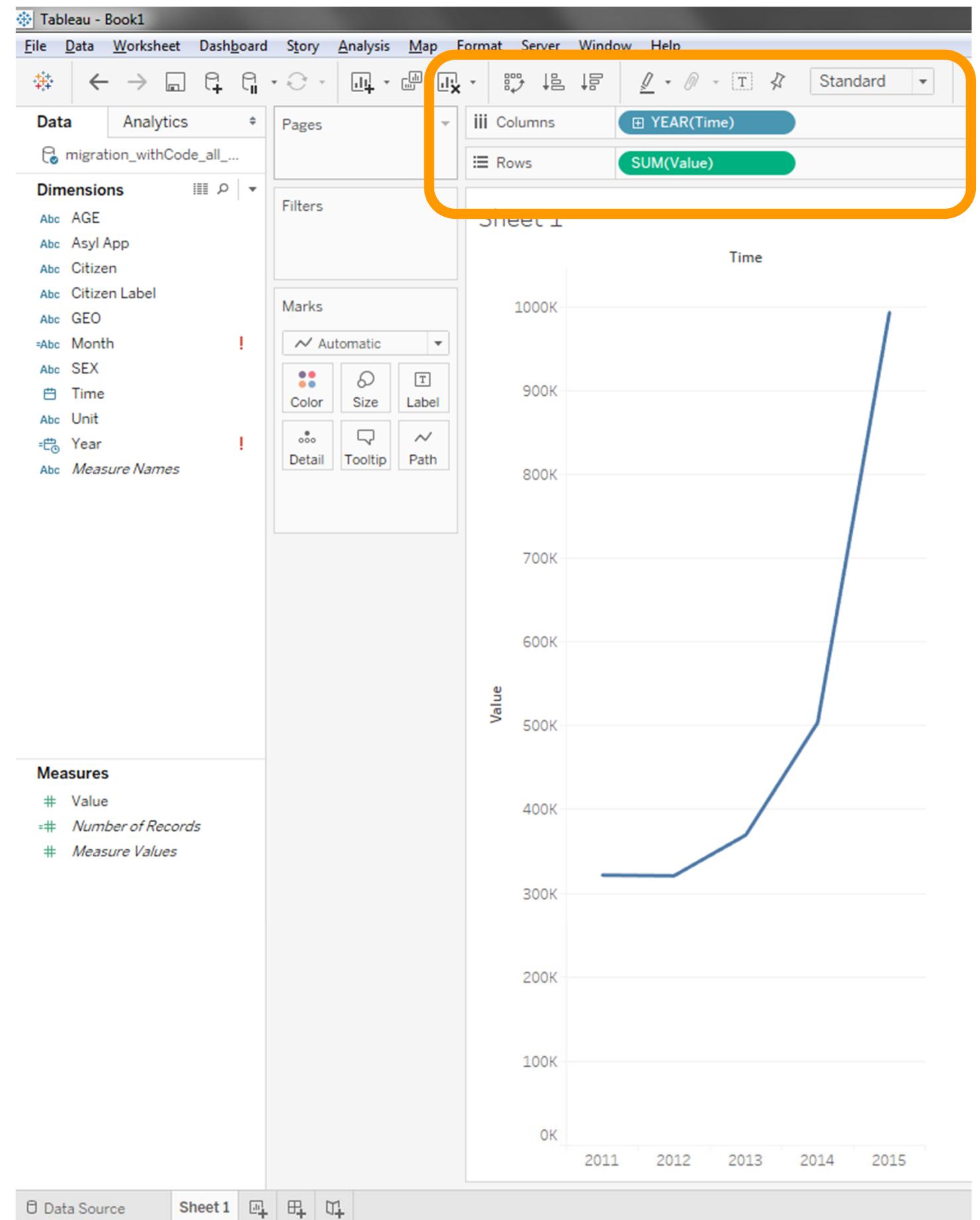
manipulating the data

- We want to treat the data as temporal data.
- So we change the data type to “Date”.
- This format now looks more like a familiar time format.

The screenshot shows the Tableau Data Source interface. In the top navigation bar, 'migration_withCode_all_noTotal' is selected under 'migration_withCode_all_noT...'. The 'Connections' section lists 'migration_withCode_all_noTotal' (Text File). The 'Files' section lists several CSV files: 'Artists_all.csv', 'HousingData.csv', 'migration_withCode_all_noTotal.csv', 'MovieData.csv', 'names.csv', 'OilData.csv', 'PoliceReportData.csv', 'Songs_all.csv', and 'New Union'. A context menu is open over the 'migration_withCode_all_noTotal.csv' file, with 'Date' selected from the 'Date & Time' option. The main pane displays a table with three columns: 'Month' (containing '1/1/2011'), 'Year' (containing 'null'), and 'Century' (containing 'null'). The first two rows of the table are circled in orange. The bottom right corner of the interface has the number '6'.

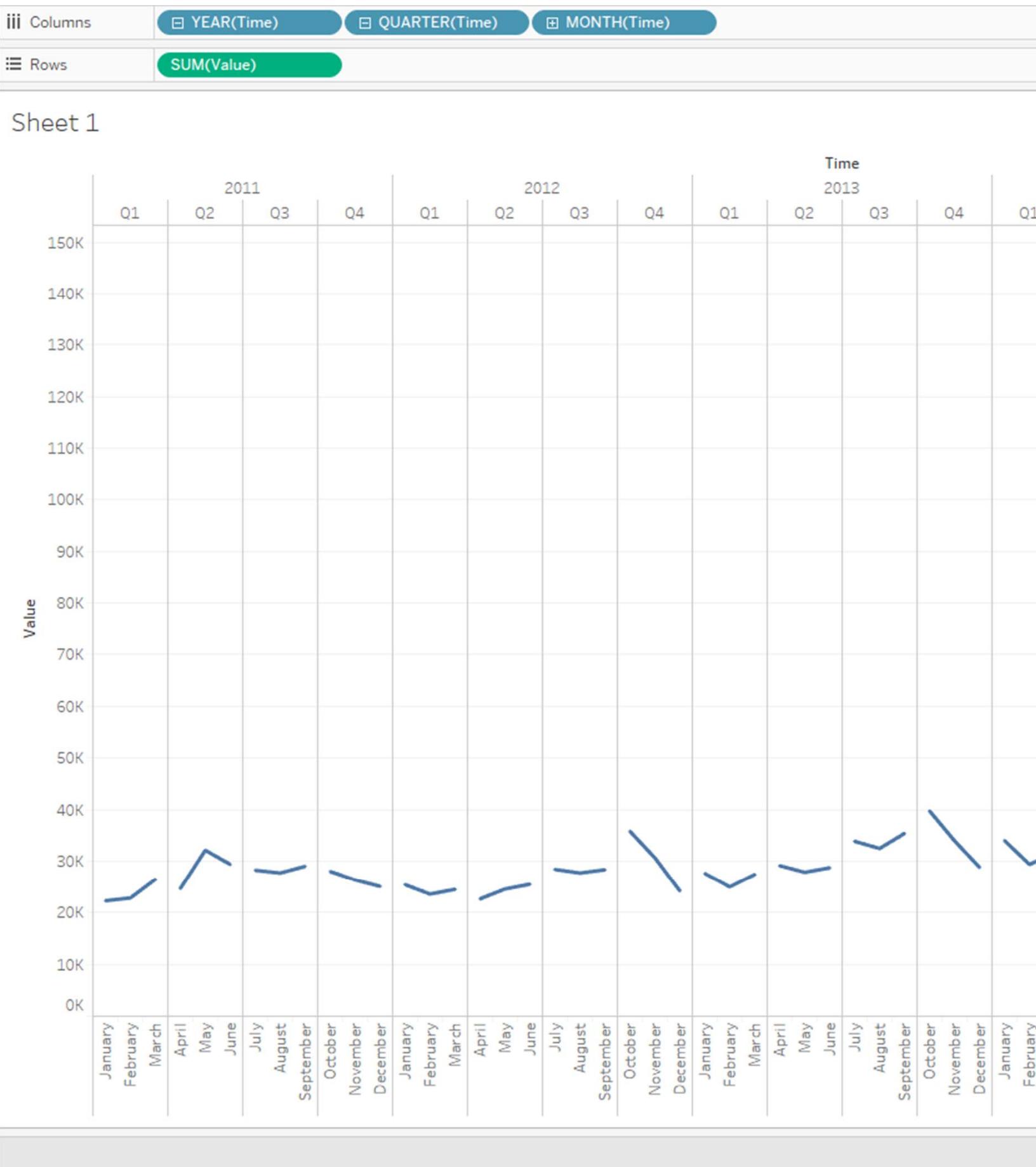
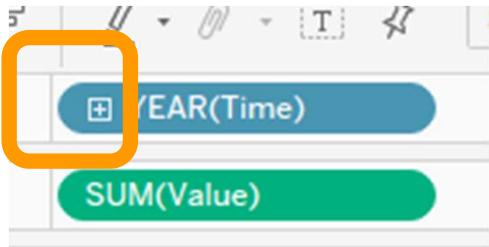
building a timeline

- Drag the “Year” attribute (ordered) into the Columns pane.
- Drag the “Value” attribute (quantitative) into the Rows pane.
- Tableau will automatically generate a line chart.



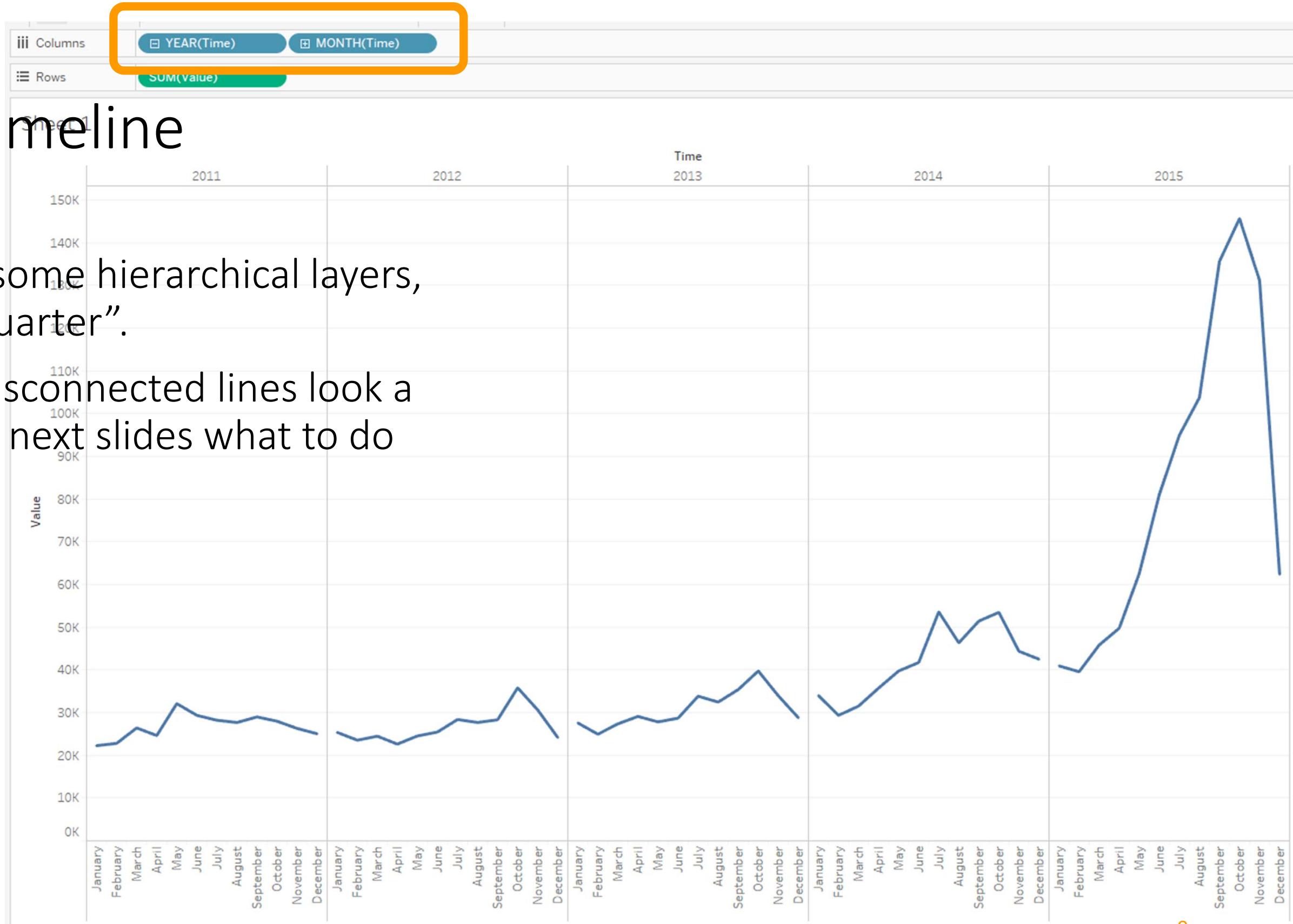
building a timeline

- Note that Tableau recognizes the Year attribute as hierarchical – it can be split into
 - Quarter
 - Month
 - Day
- Just press the + button



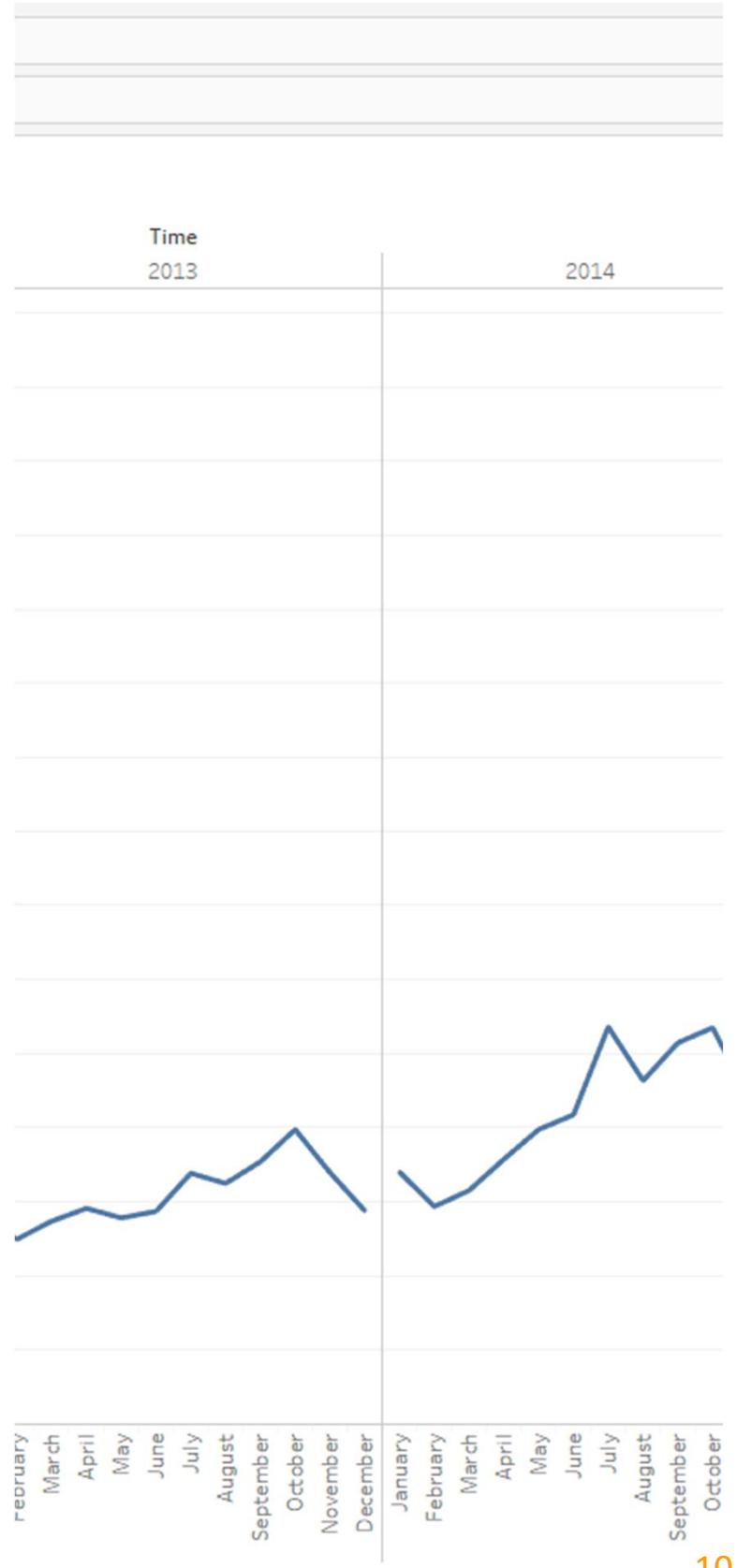
building a timeline

- We can delete some hierarchical layers, for example “Quarter”.
- However, the disconnected lines look a bit strange (see next slides what to do about it)



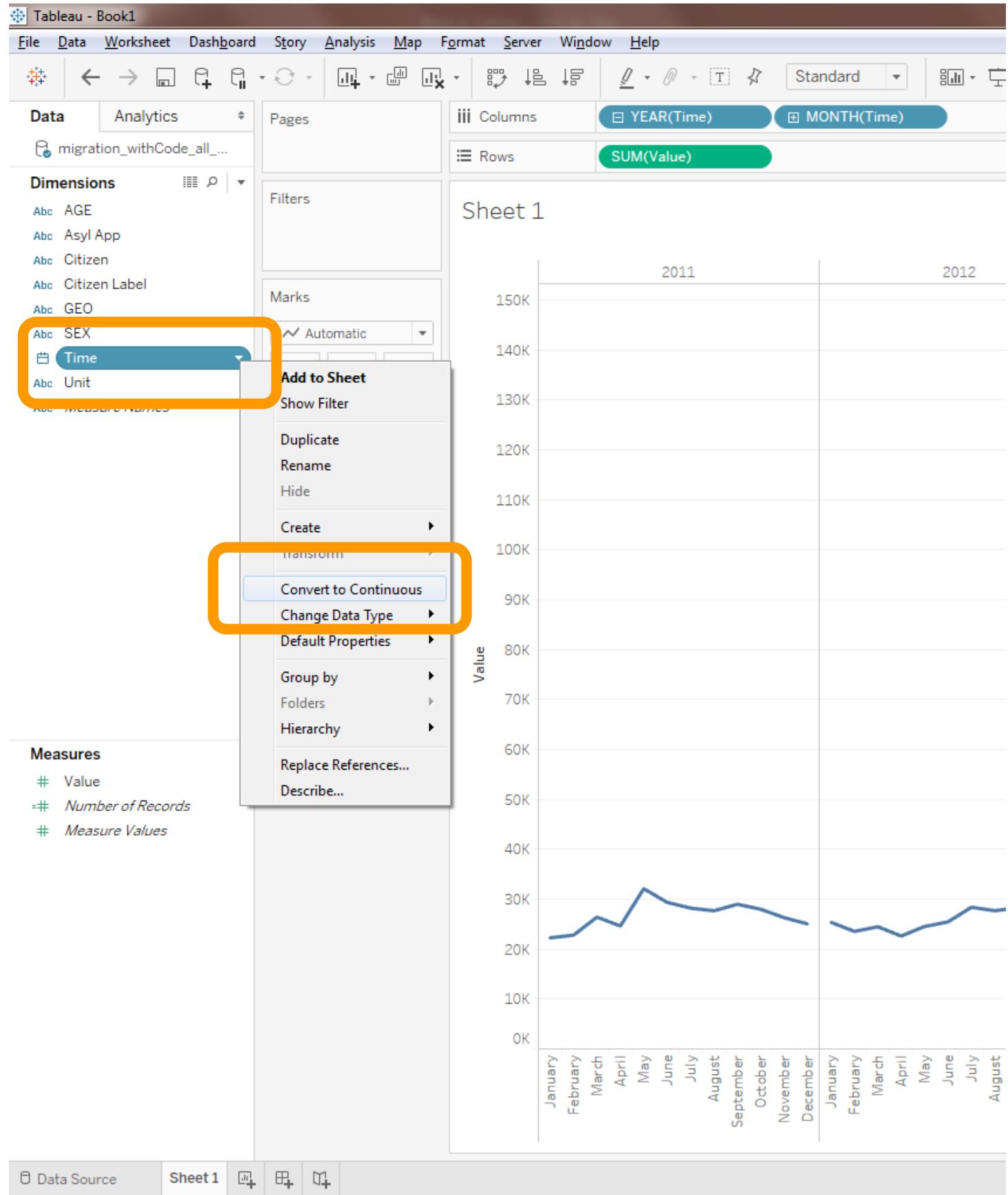
refining the line graph

- The disconnected lines in the line graph are because the temporal attributes are treated as discrete data.



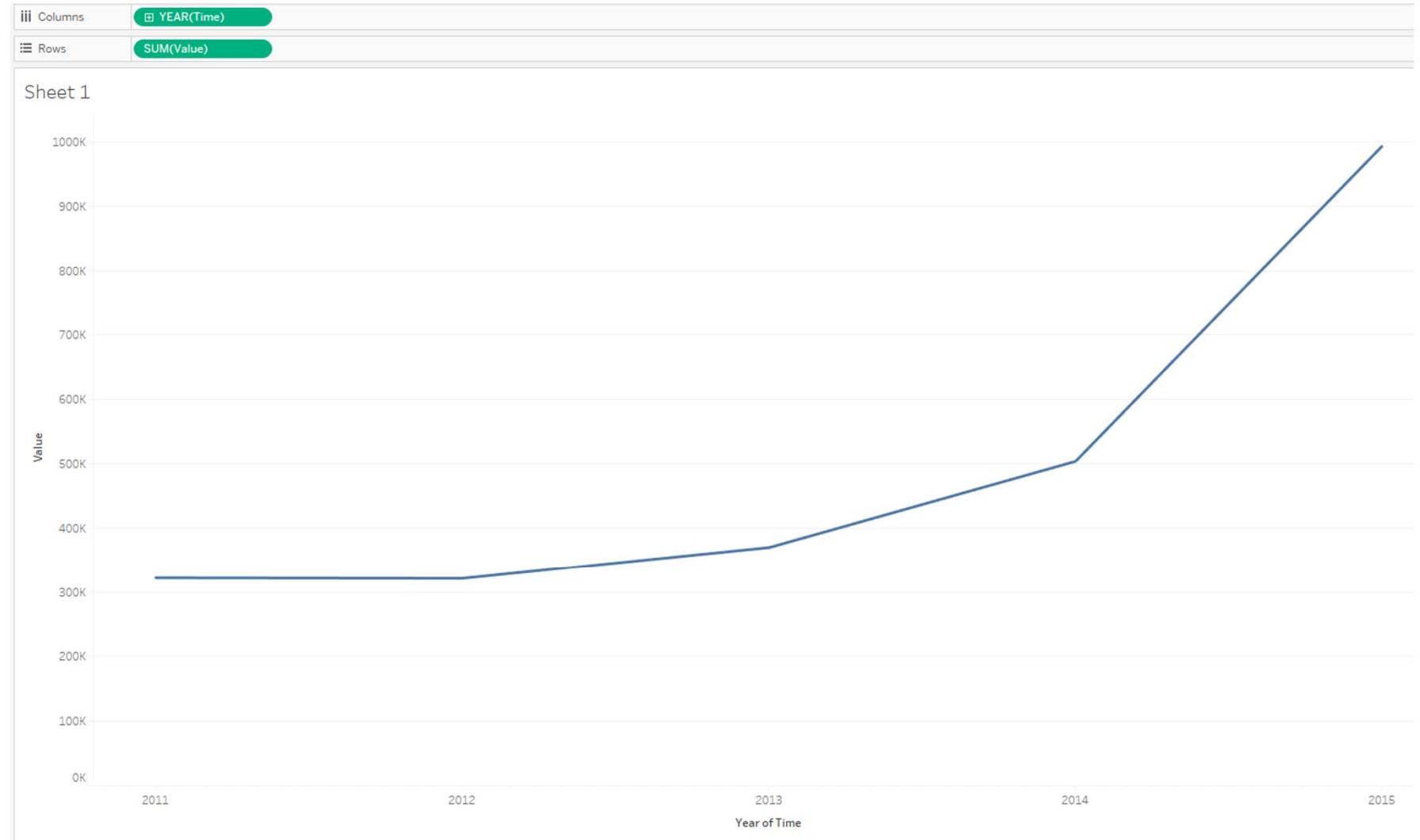
refining the line graph

- We can fix this, by making “Year” a continuous dimension.
- Remove the discrete “Year” and “Month” attributes from the Columns pane and rebuild your line graph.



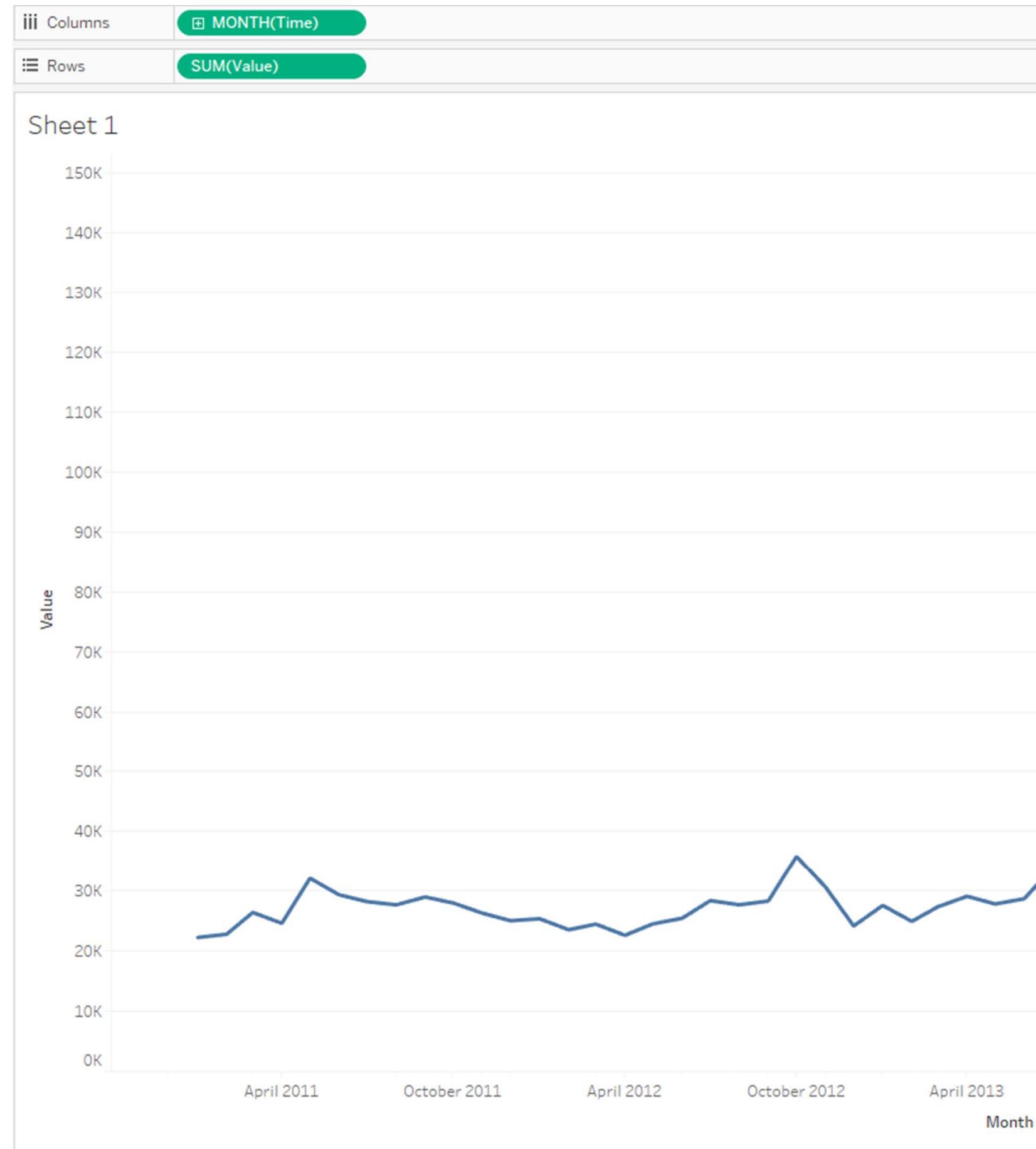
refining the line graph

- As you can see, “Year” now appears green just like a Measure can values are plotted continuously



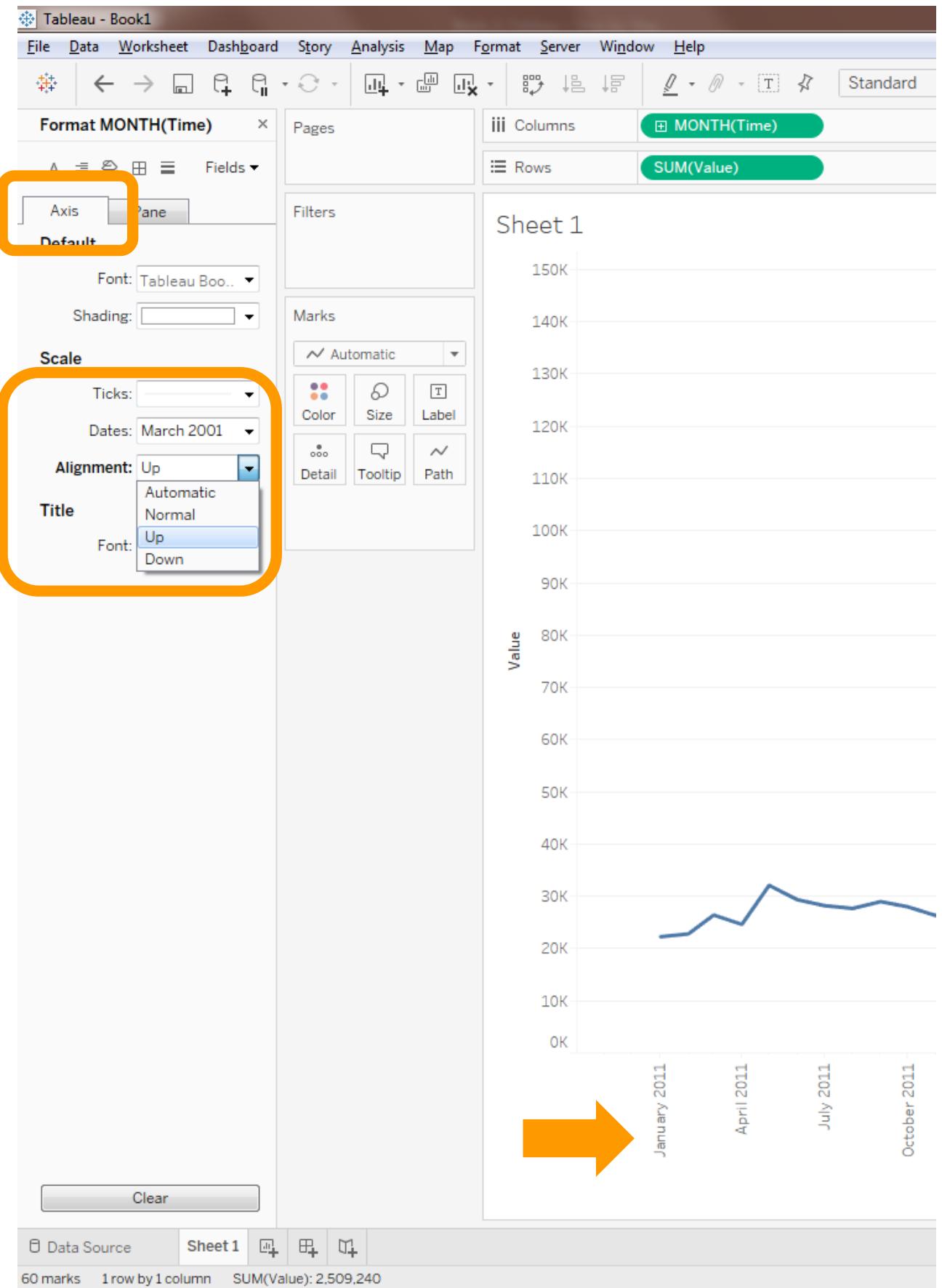
refining the line graph

- And of course, we can show the data at lower granularity by pressing the “+” button

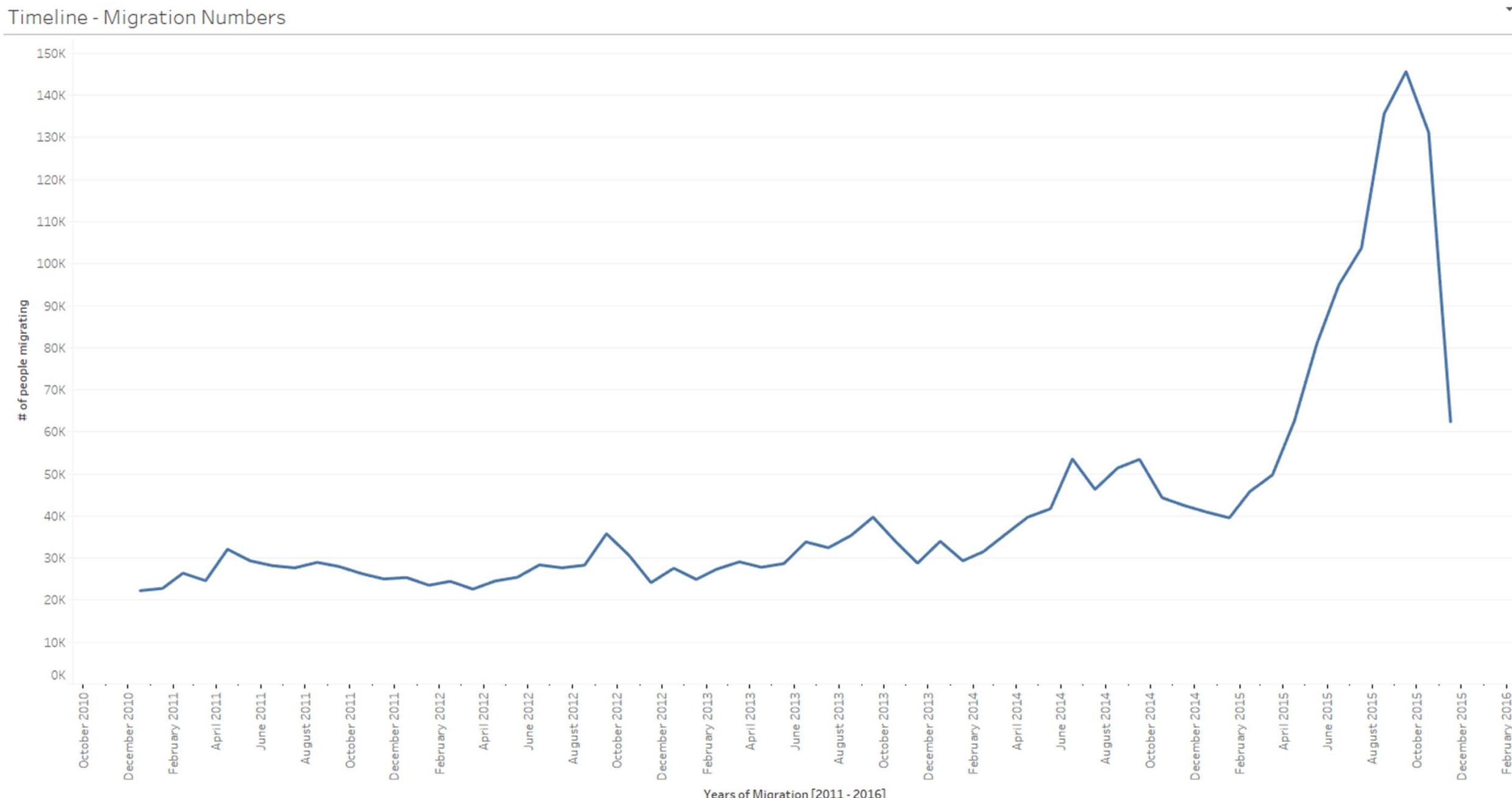


stylizing x-axis

- Change labels and their alignment on the x-axis.
 - Right-click the x-axis and select “Format”
 - Change alignment to vertical alignment
 - You can also add ticks to the timeline for better readability



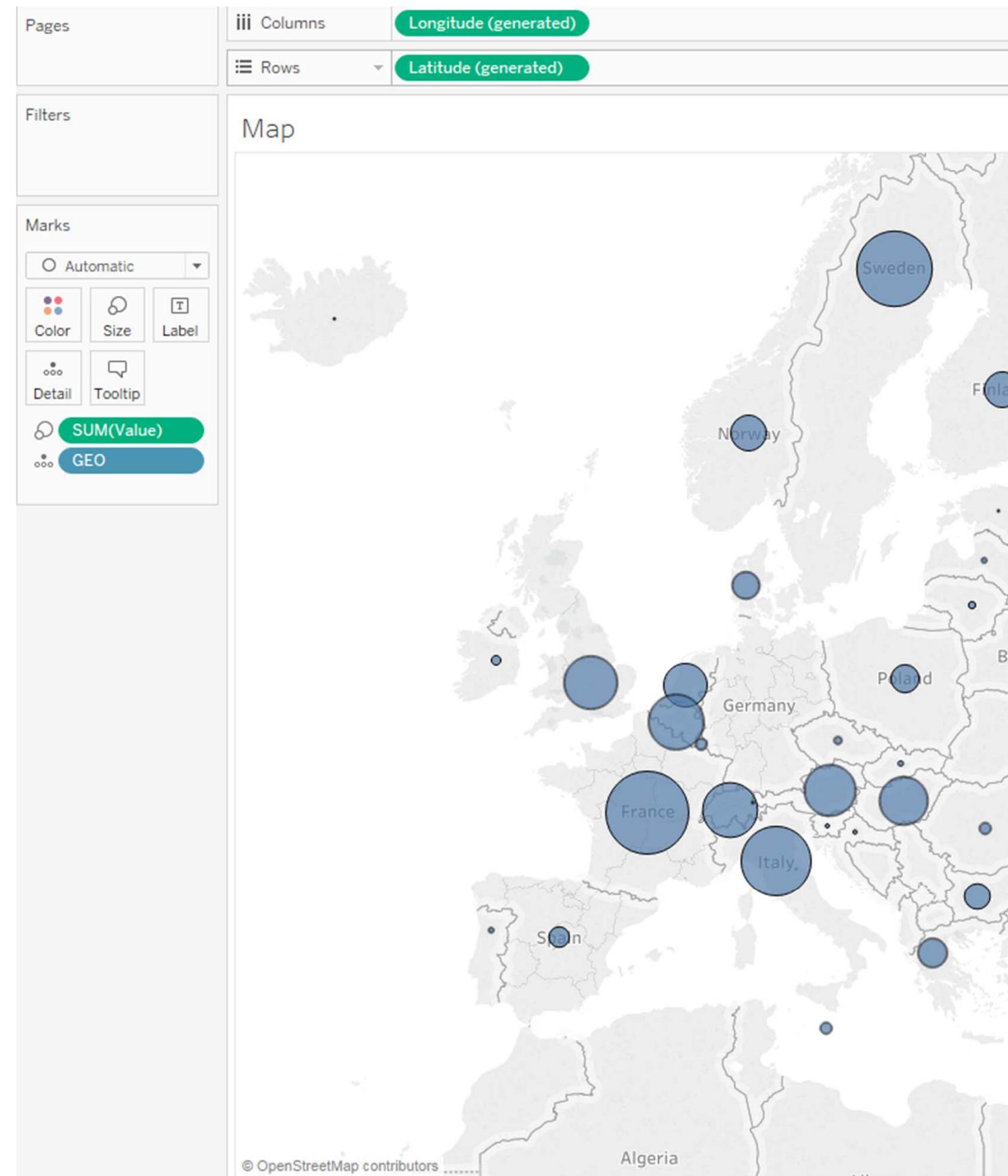
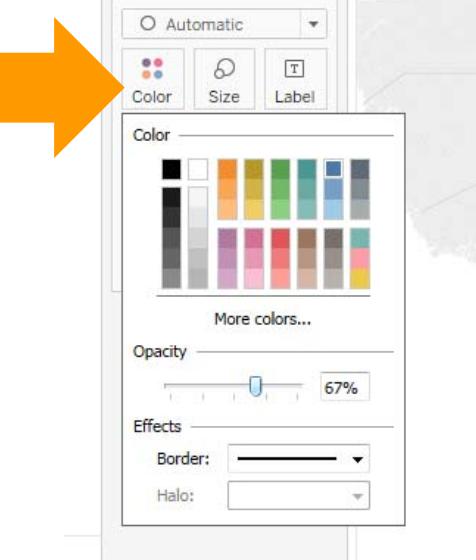
timeline



linking timeline to map

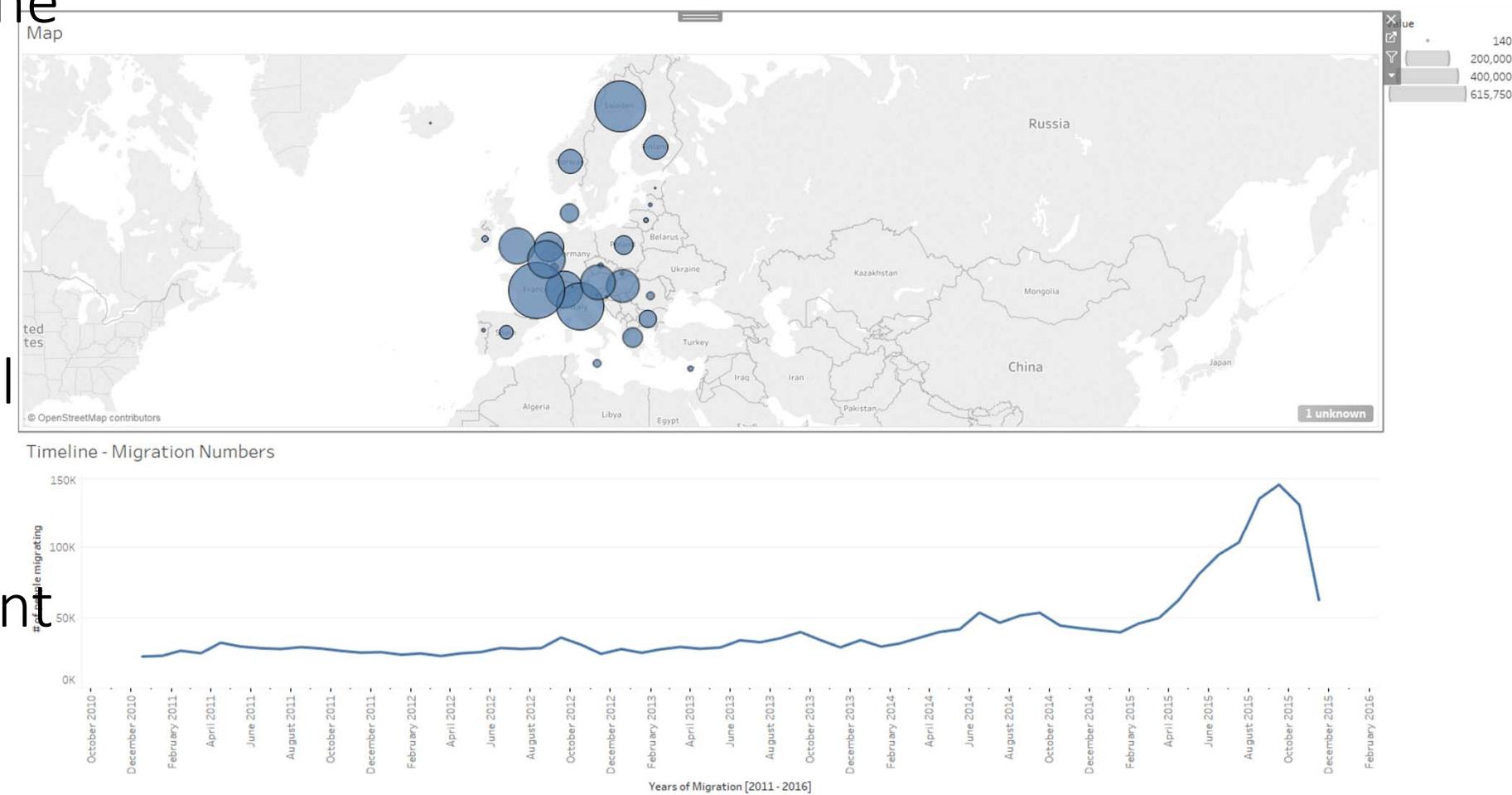
some geographic data

- Build another worksheet with a geographic map that shows the total number of immigrants into Europe.
- If you don't know how to do this, check Tableau tutorial 01.
- Here, we have applied transparency to the circles on the map, to better deal with potential overlaps.



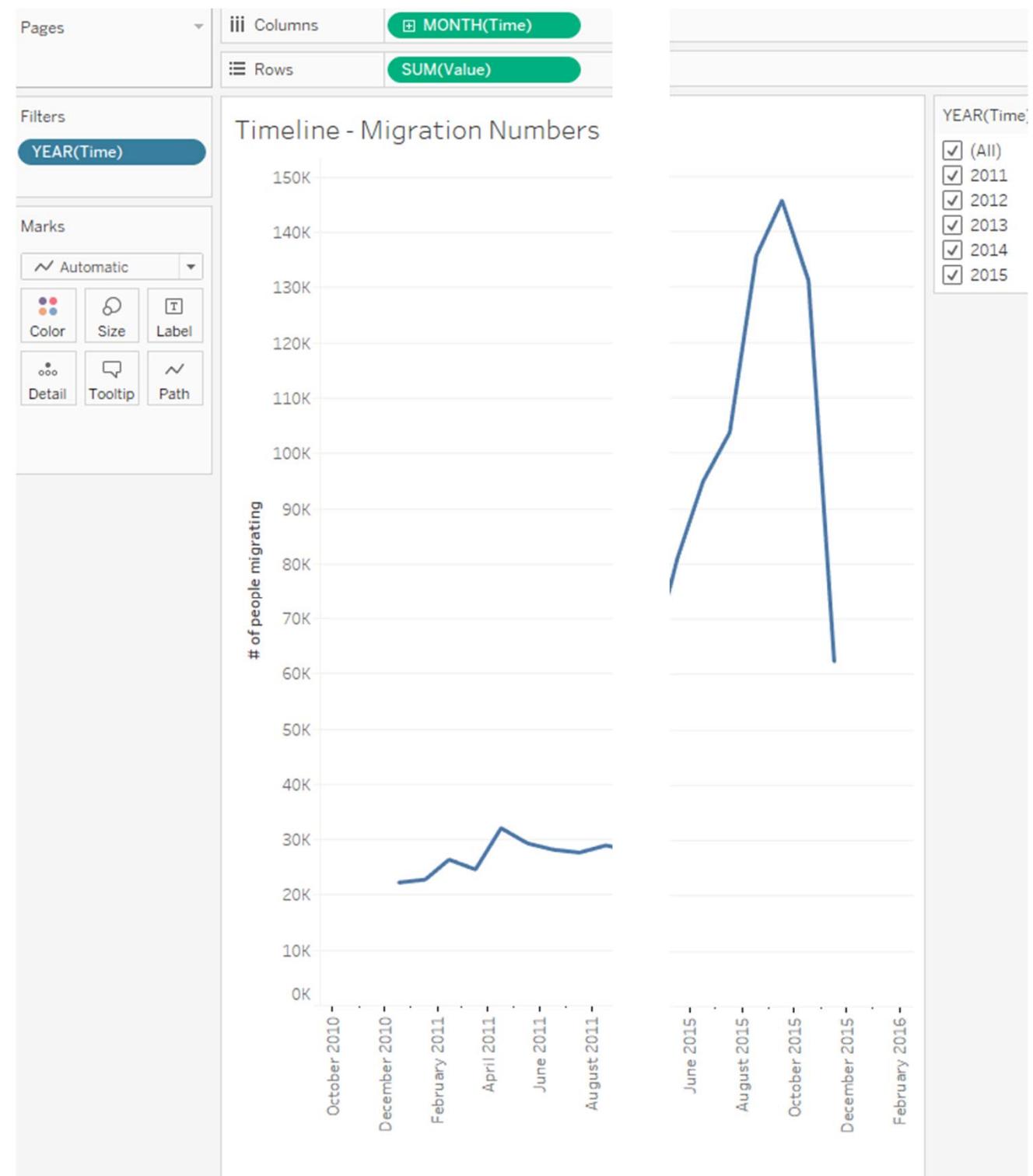
create a dashboard

- Create a dashboard juxtaposing the timeline and map.
- If you don't know how to do this, check Tableau tutorial 01.
- Note that you can set the size of the dashboard by in the left panel under "size"
- Make sure that the views are aligned and sized so that important features are visible. E.g., the timeline should not be too flat as trends will not be visible.



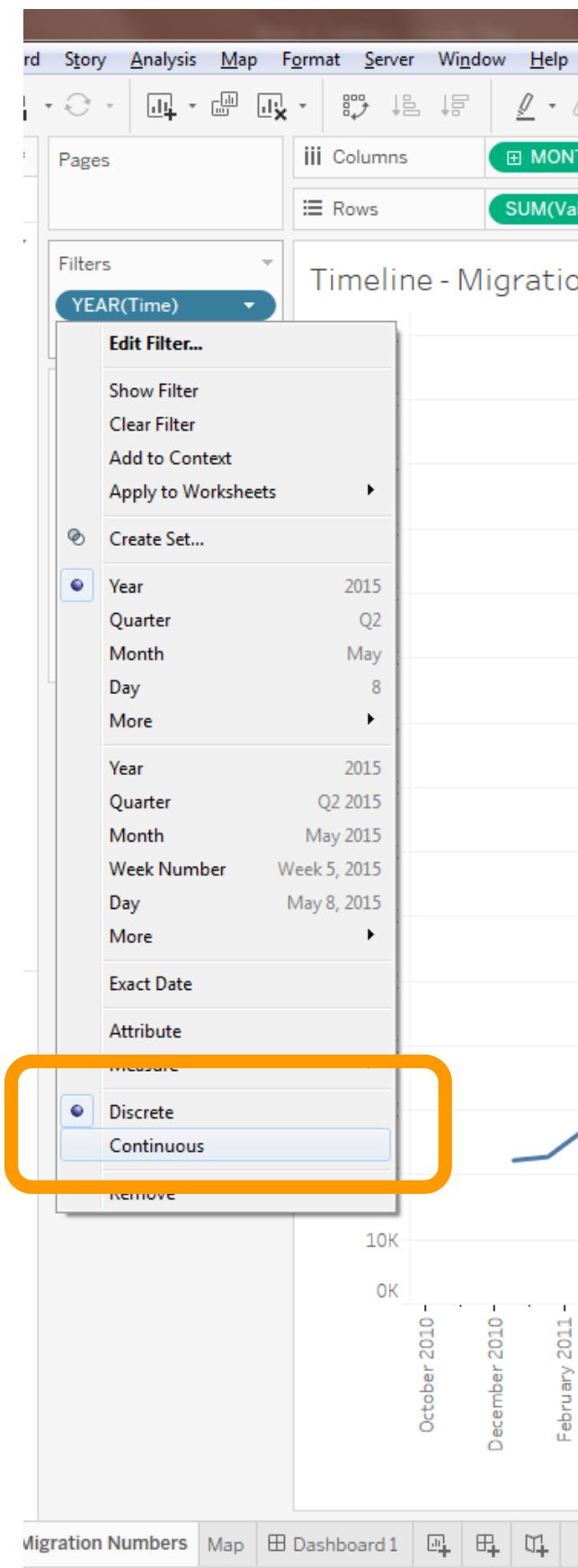
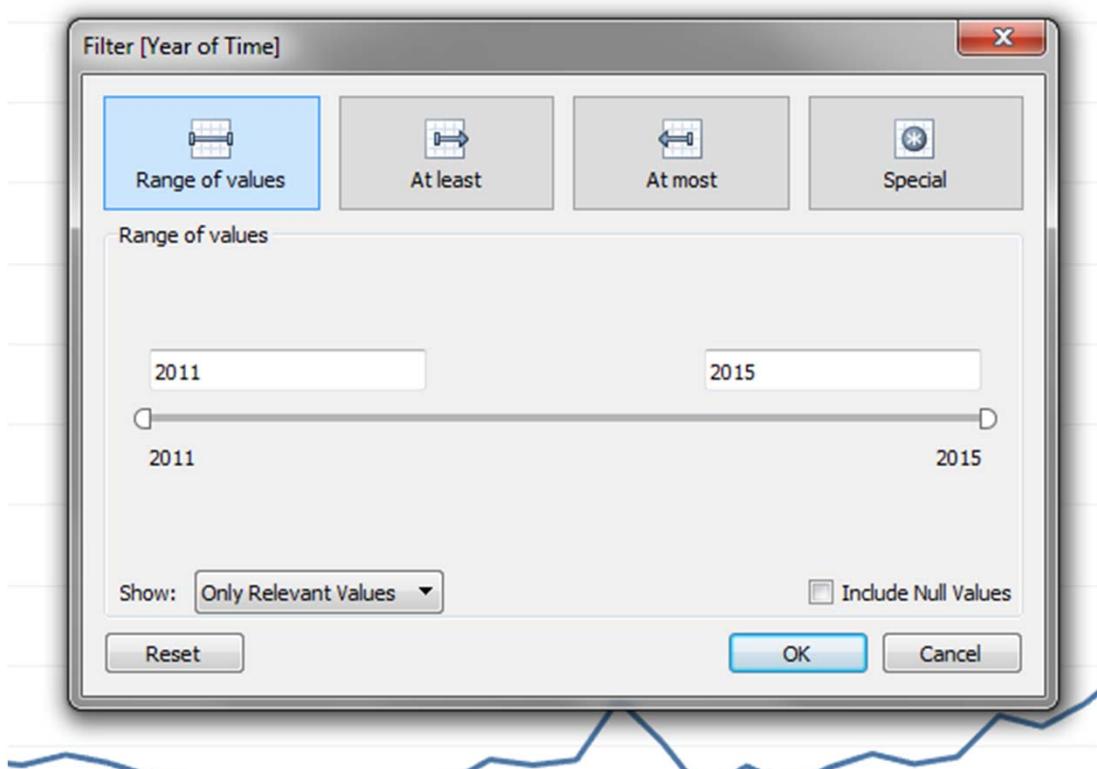
interactive timeline

- Let's make the timeline interactive to allow "zooming" into particular years.
- One option would be to apply a filter by year.
- Go to the timeline worksheet and create such a filter.
- If you don't know how to do this, check Tableau tutorial 01.
- This would give you a check-box filter where individual years can be selected.



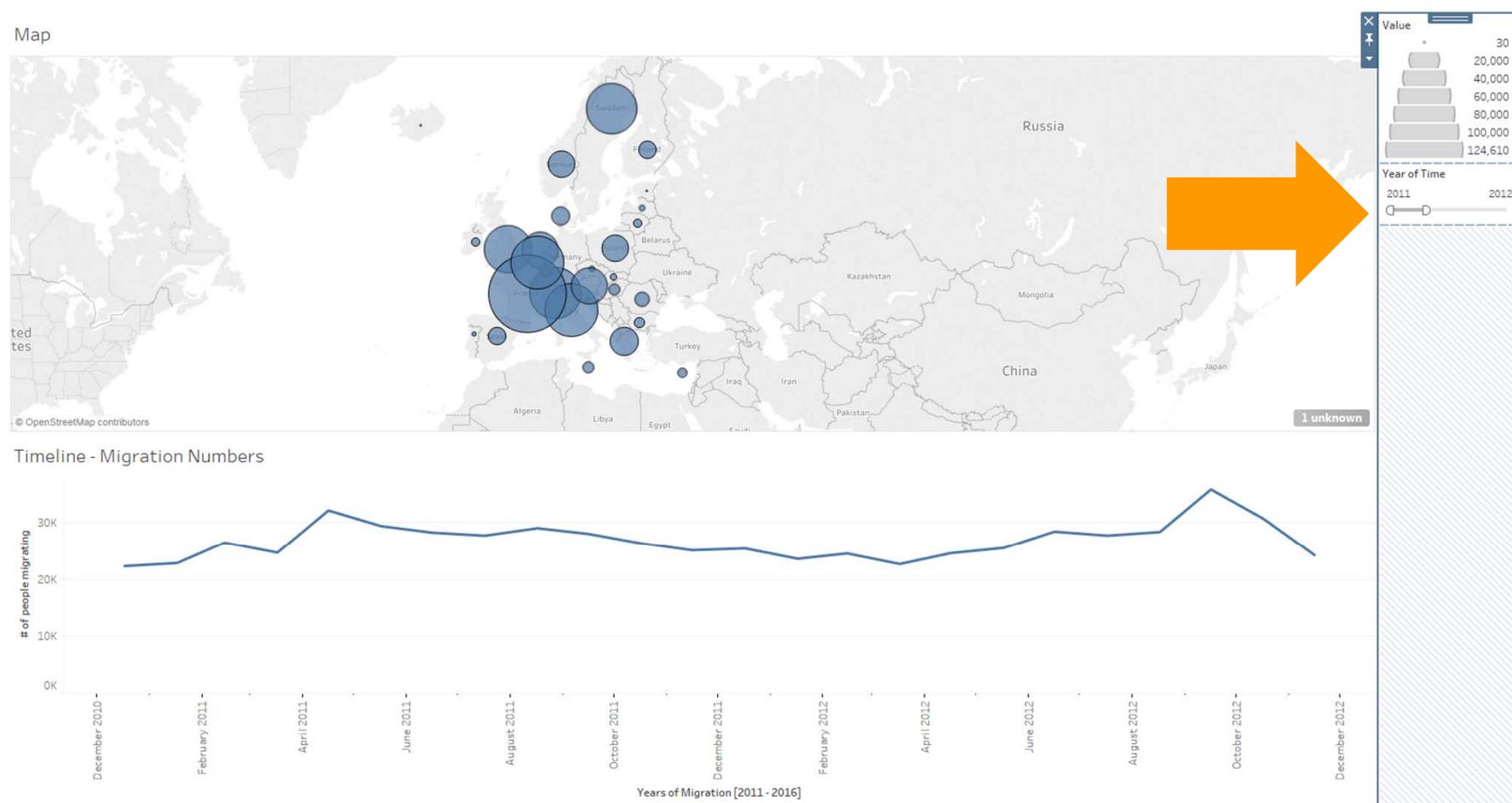
interactive timeline

- We can also create a continuous filter, by treating year, as an attribute with continuous values.



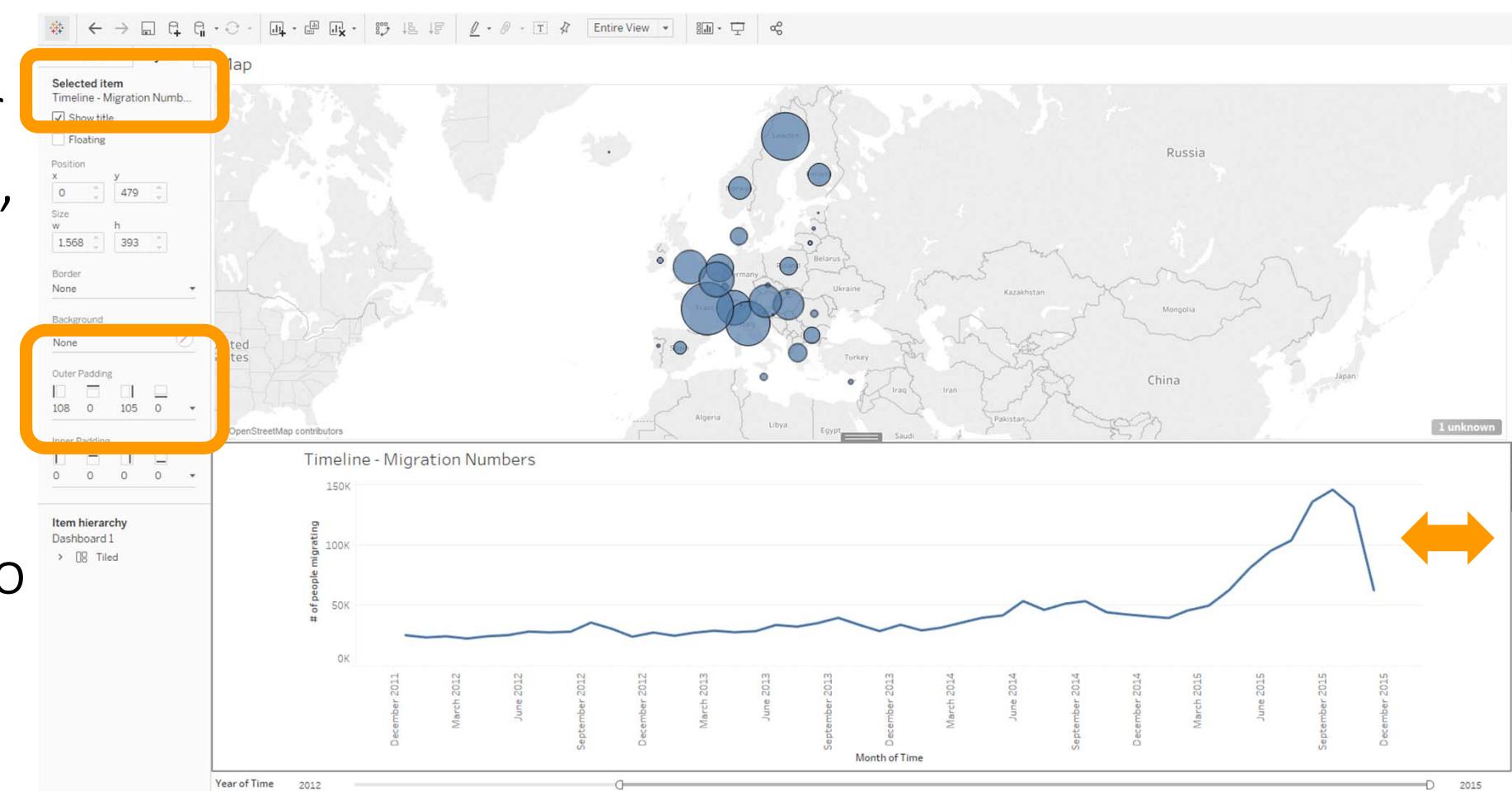
interactive timeline

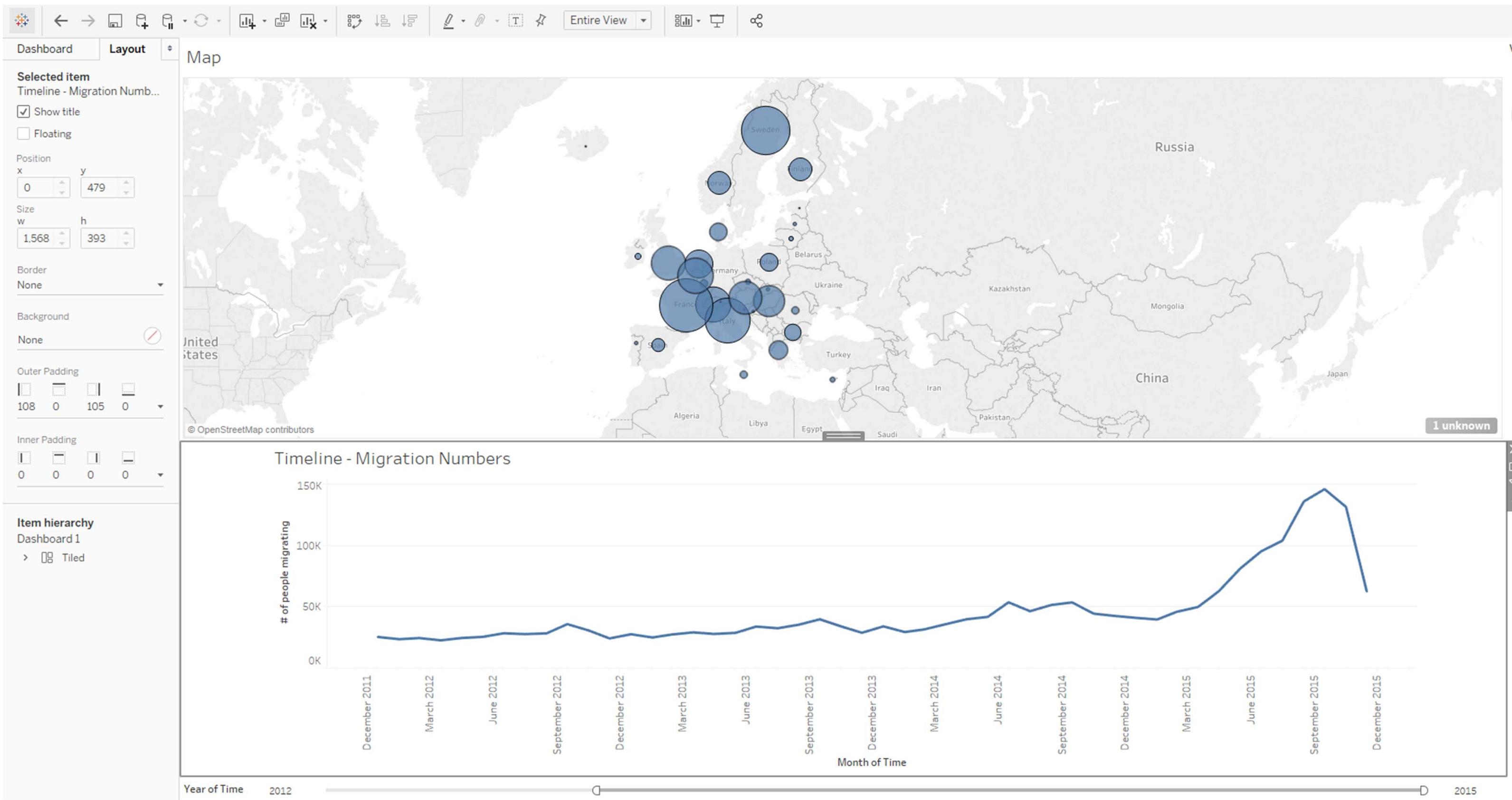
- Go back to the dashboard and connect the time slider filter (which will only apply to the timeline) also to the map.
- If you don't know how to do this, check Tableau tutorial 01.
- You will find the slider difficult to use, as it is relatively small and it is hard to select time ranges accurately.



interactive timeline

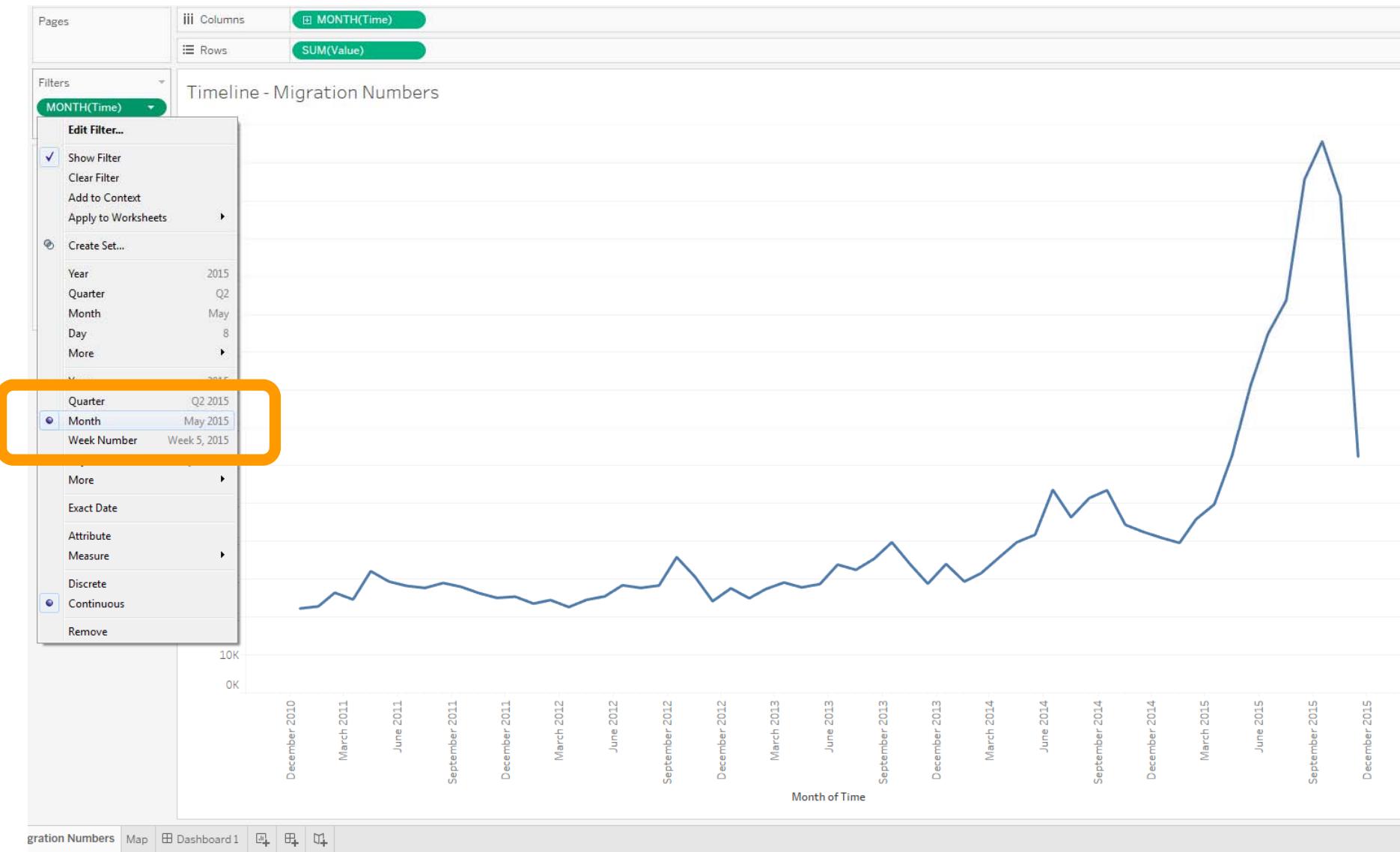
- Arranging the filter below the timeline, provides more space for interaction and, at the same time, the timeline can act as an reference to values connected to the selected time range.
- Outer padding can be applied to the timeline worksheet in order to align the timeline axis and the timeline filter



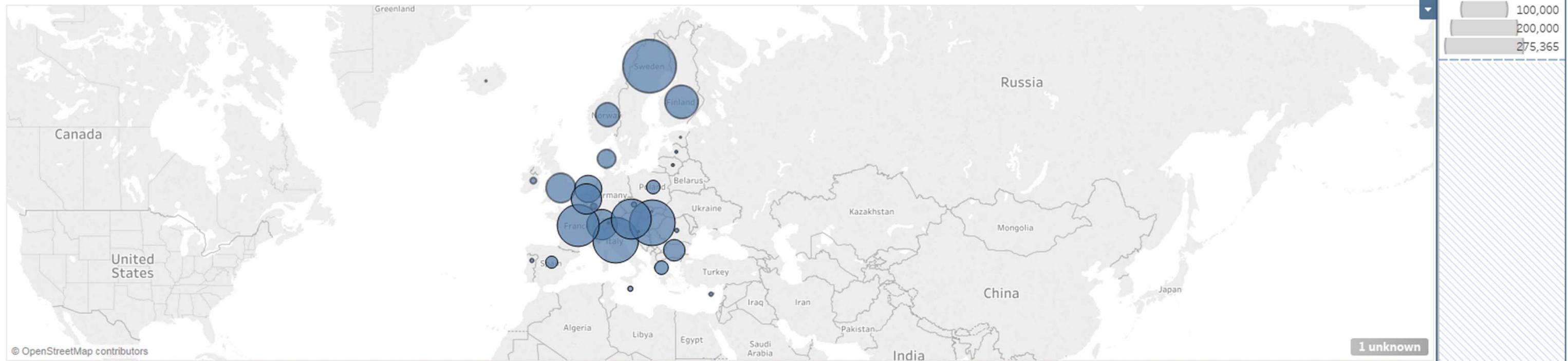


interactive timeline

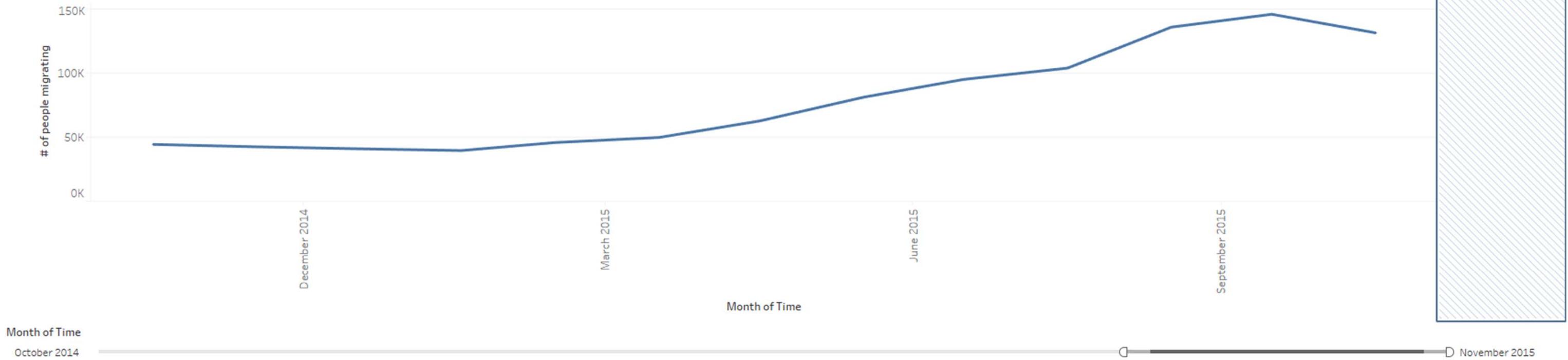
- The current timeline slider can only select years. To make it more fine-grained, you can change its option in the timeline worksheet.
- Update the filter in your dashboard.



Map



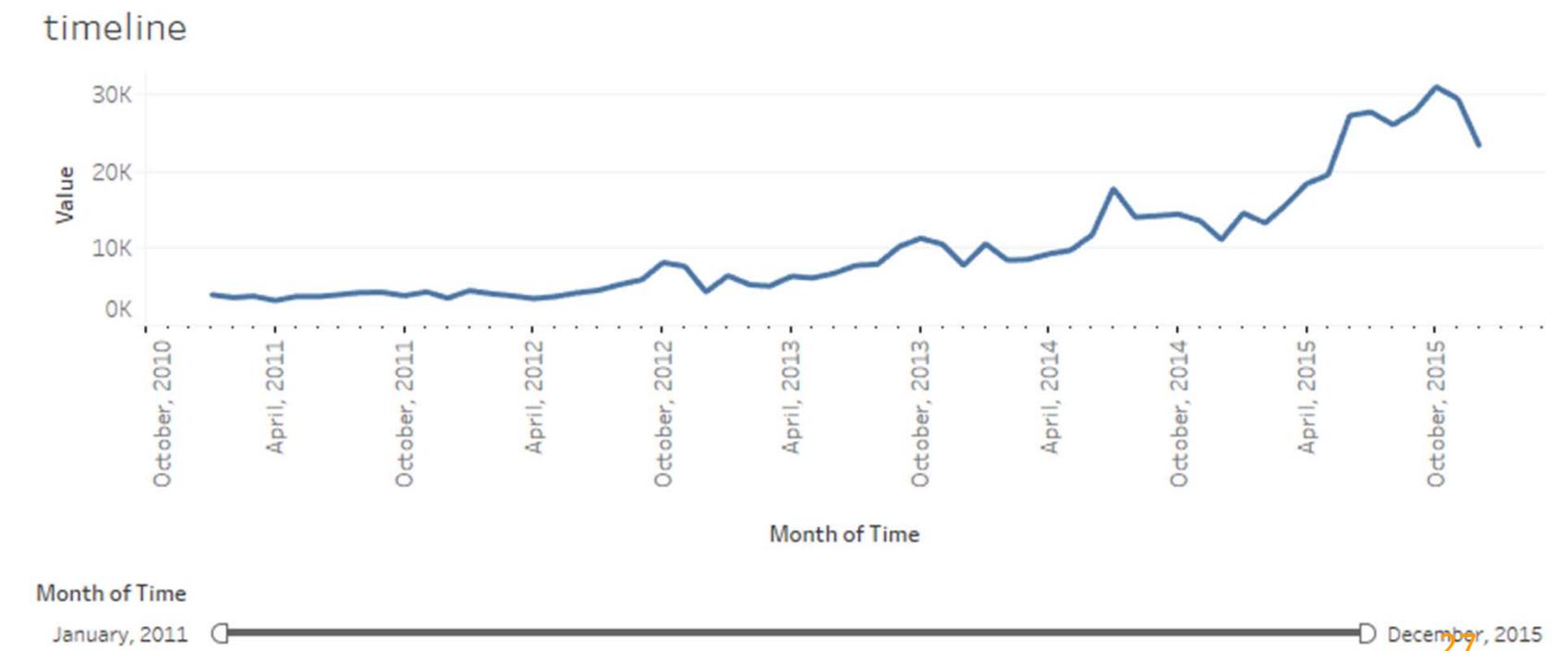
Timeline - Migration Numbers



customizing dashboard interactivity

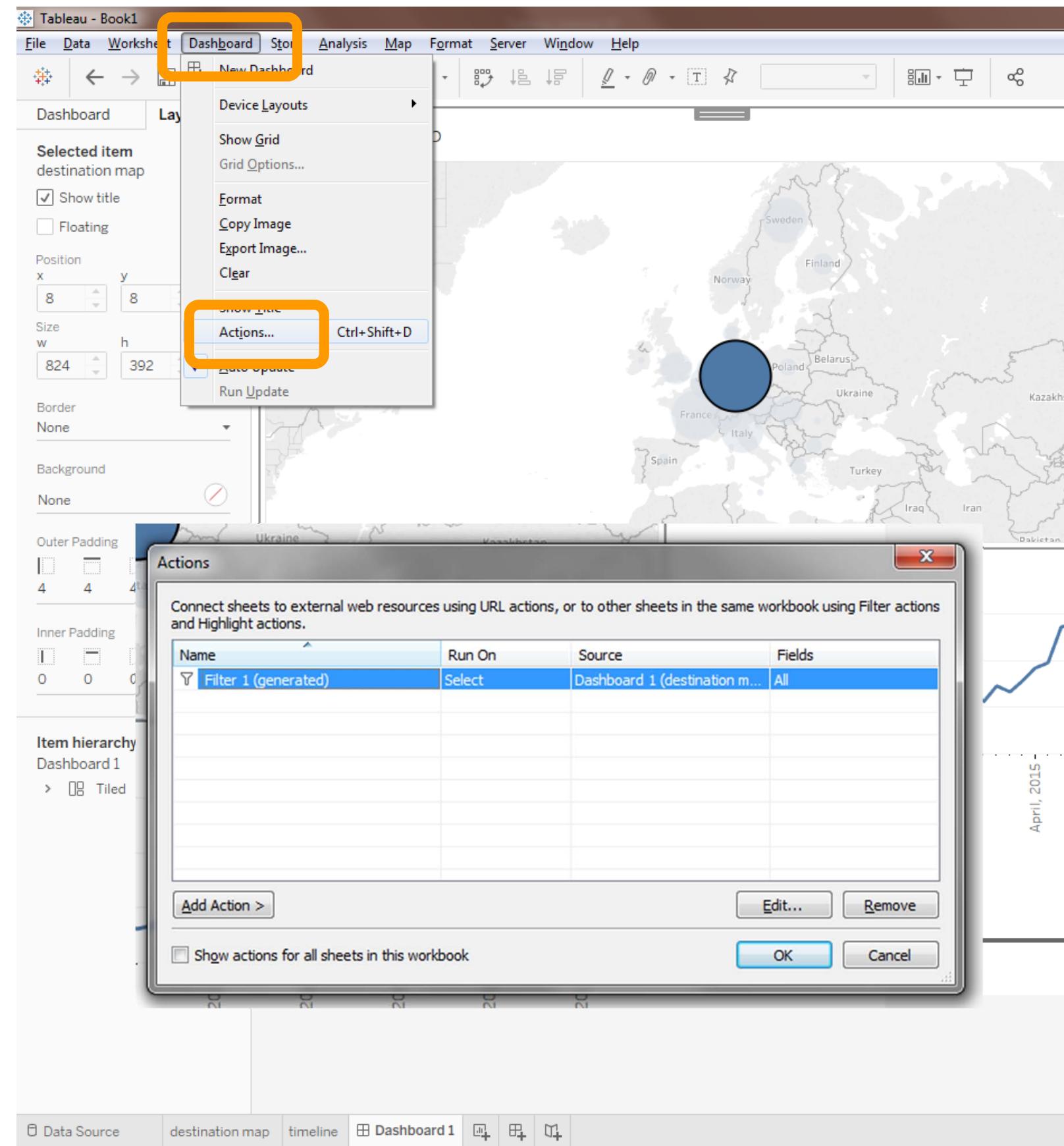
dashboard actions

- Right now, clicking on countries in your map changes the timeline.
- Let's change this to a hover interaction.



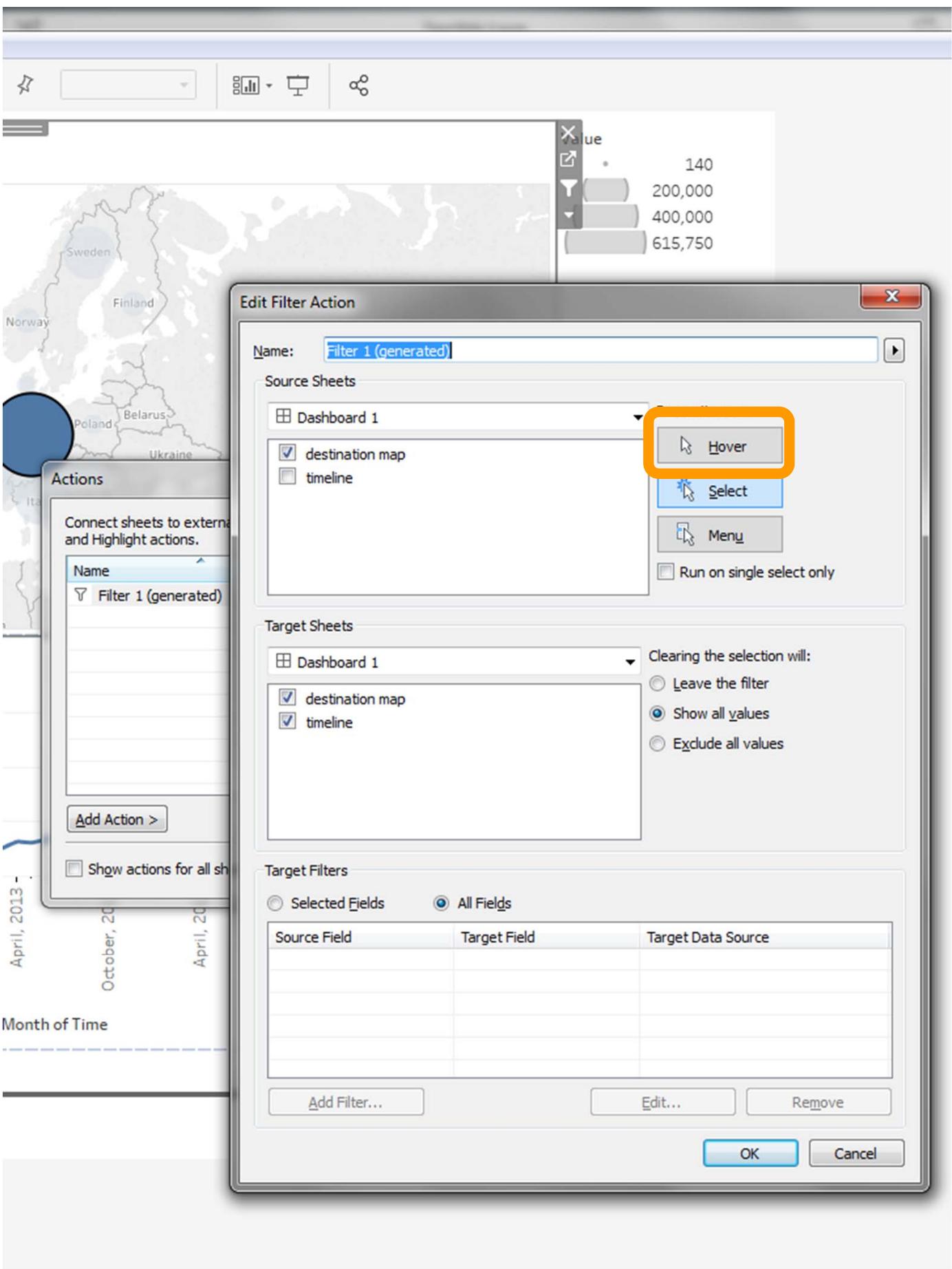
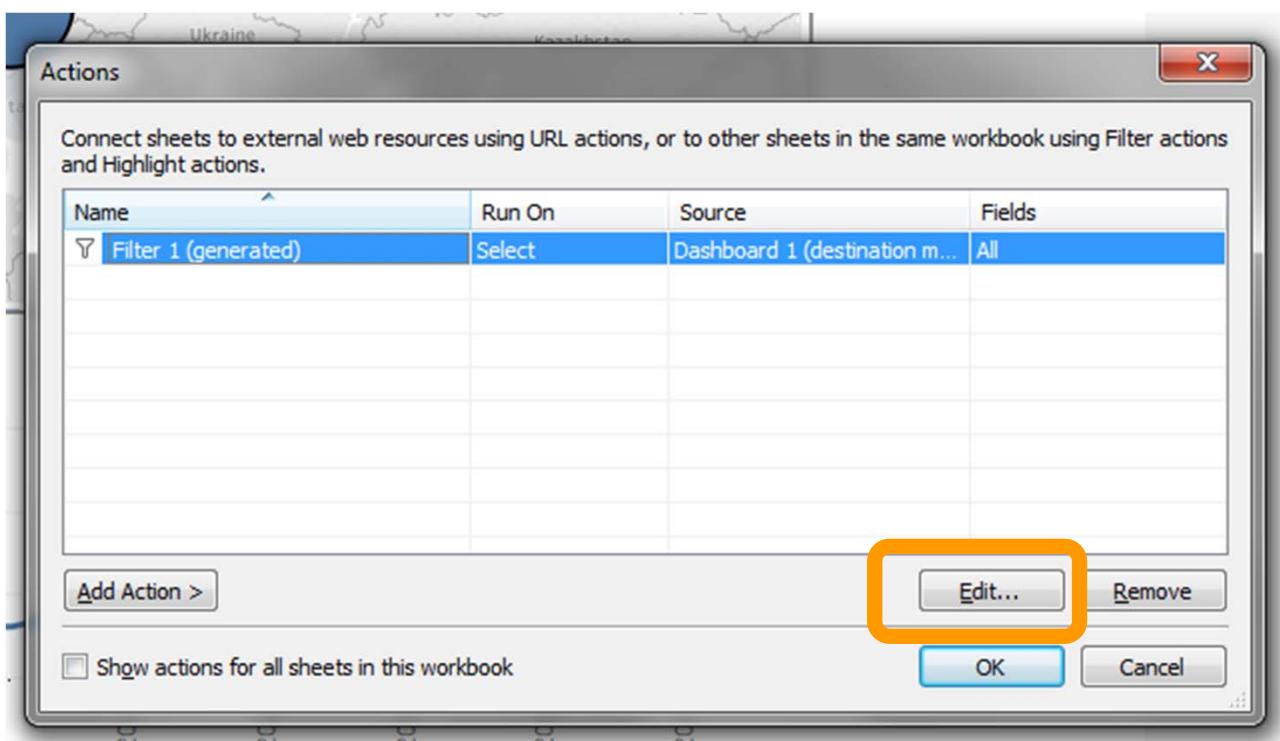
dashboard actions

- In the menu click on “Dashboard” and then “Actions”.
- The “Action” settings will come up.
- We already have one filter action here that connects the map to the timeline.



dashboard actions

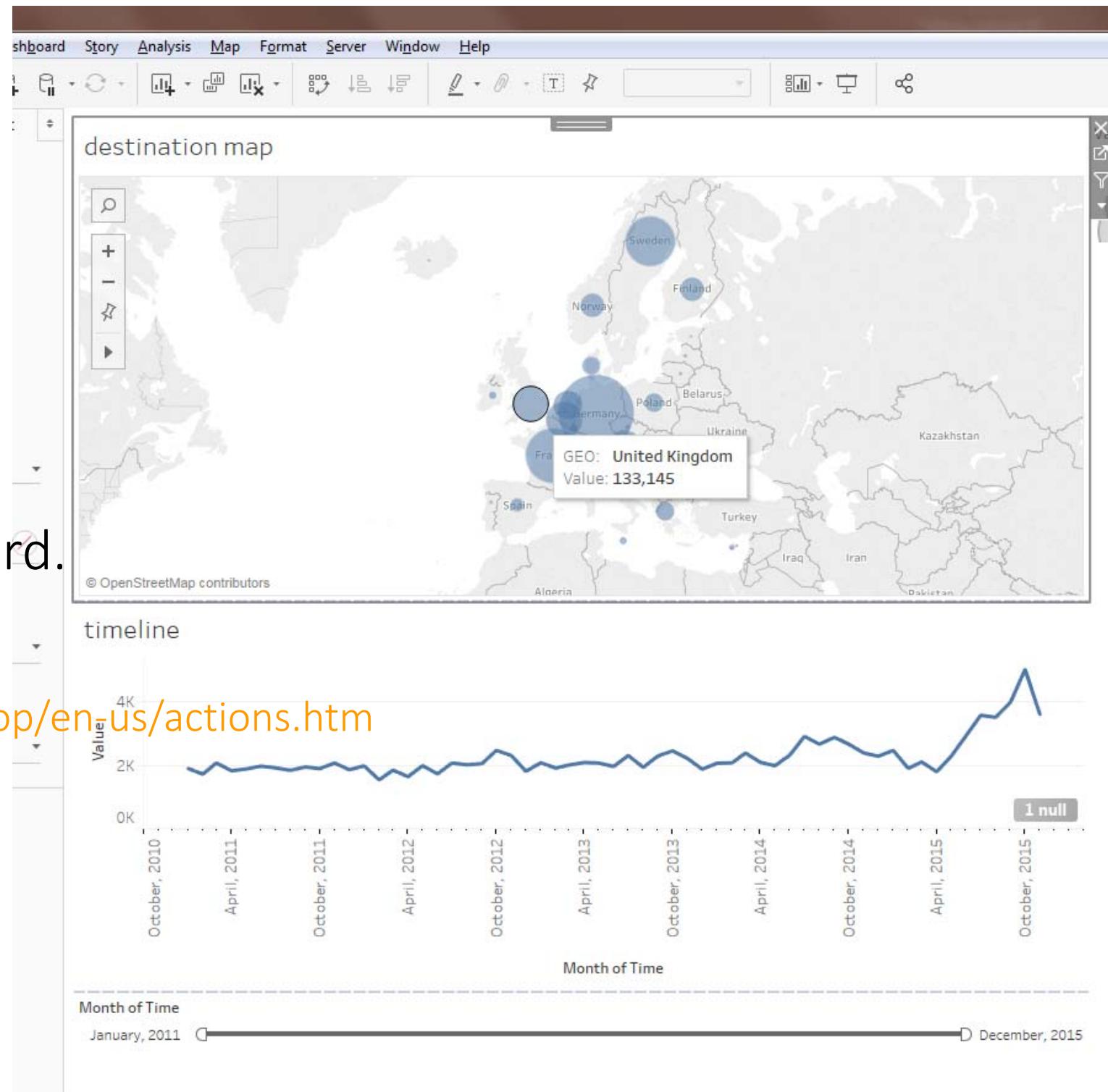
- Click “Edit” to modify this filter.
- Currently the filtering works upon mouse-click “Select”.
- Let’s change this to a “Hover” and click “ok”.



dashboard actions

- When we now hover over the circles in the map, the timeline will change.
- Actions can be a powerful way to customize interactions in your dashboard.
- More information can be found here

<https://onlinehelp.tableau.com/current/pro/desktop/en-us/actions.htm>



parameters in Tableau

parameters in Tableau

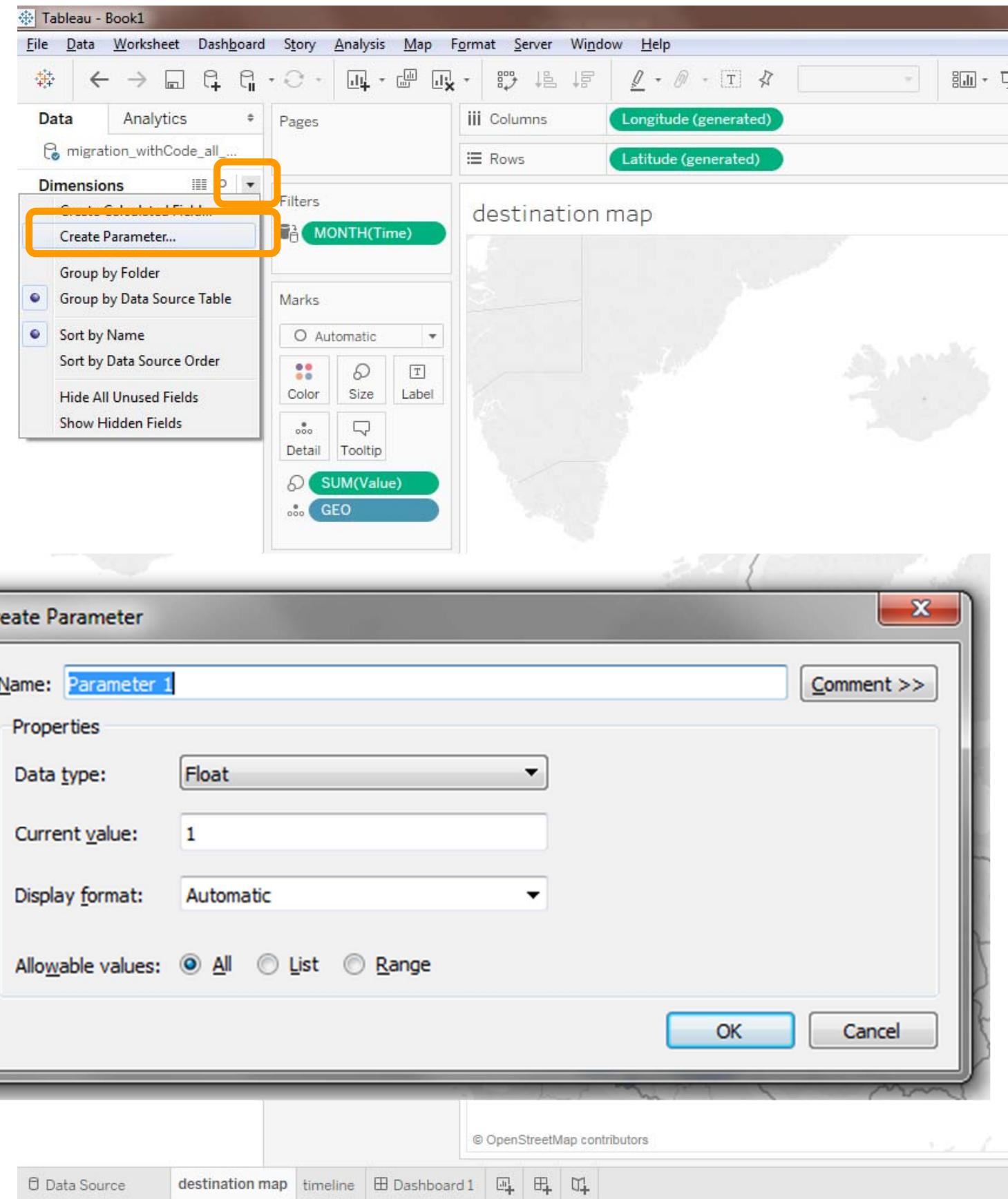
- Allow for more customised interactivity in your visualisations
 - Help implement if-then scenarios, e.g., to allow the user to flip between views of different attributes.
- Important points to remember
 - Parameters should be used as part of calculations to be useful
 - The parameter control should be displayed so that the user can interact with it.
- Useful information
 - <https://onlinehelp.tableau.com/current/pro/desktop/en-us/changing-views-using-parameters.htm>
 - <https://www.tableau.com/learn/tutorials/on-demand/parameters>

example use of parameters

- In the data set we have two interesting attributes
 - Destination countries of immigrants
 - Immigrants' countries of origin
- Let's create a parameter and corresponding calculated field to allow the user to flip between the two.

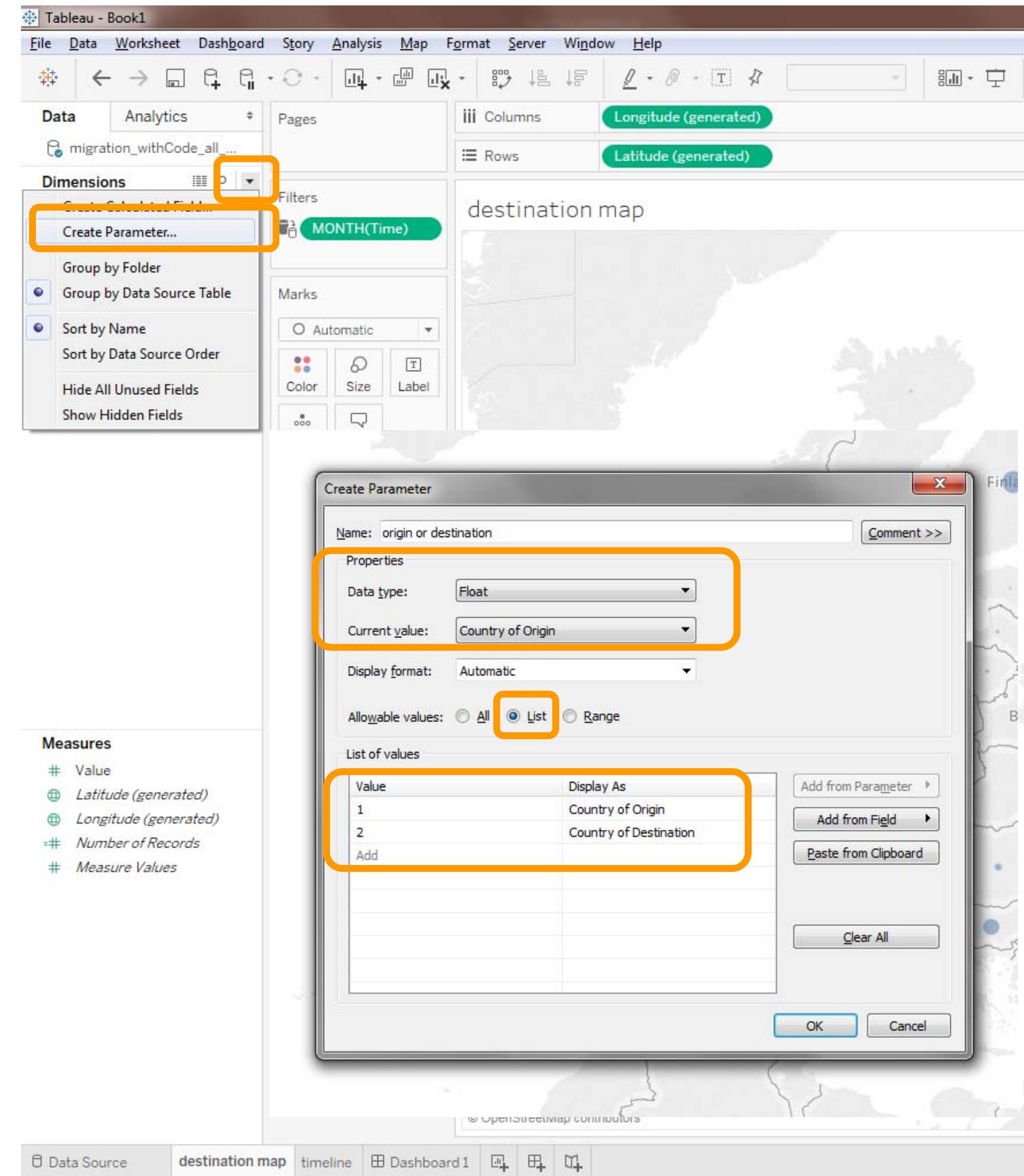
creating a parameter

- Go to your map visualisation worksheet
- Above the “Dimensions” pane, select the drop-down menu to create a “Create Parameters...”



creating a parameter

- Give the parameter a meaningful name that matches its purpose, for example:
 - “origin or destination”
- Let’s configure the parameter.
- We leave the data type at “float”
- We want to manipulate the list of allowable values, so we select “List”
- Here we set parameter options
 - 1 for “Country of Origin”
 - 2 for “Country of Destination”
- Click “ok”



creating a parameter

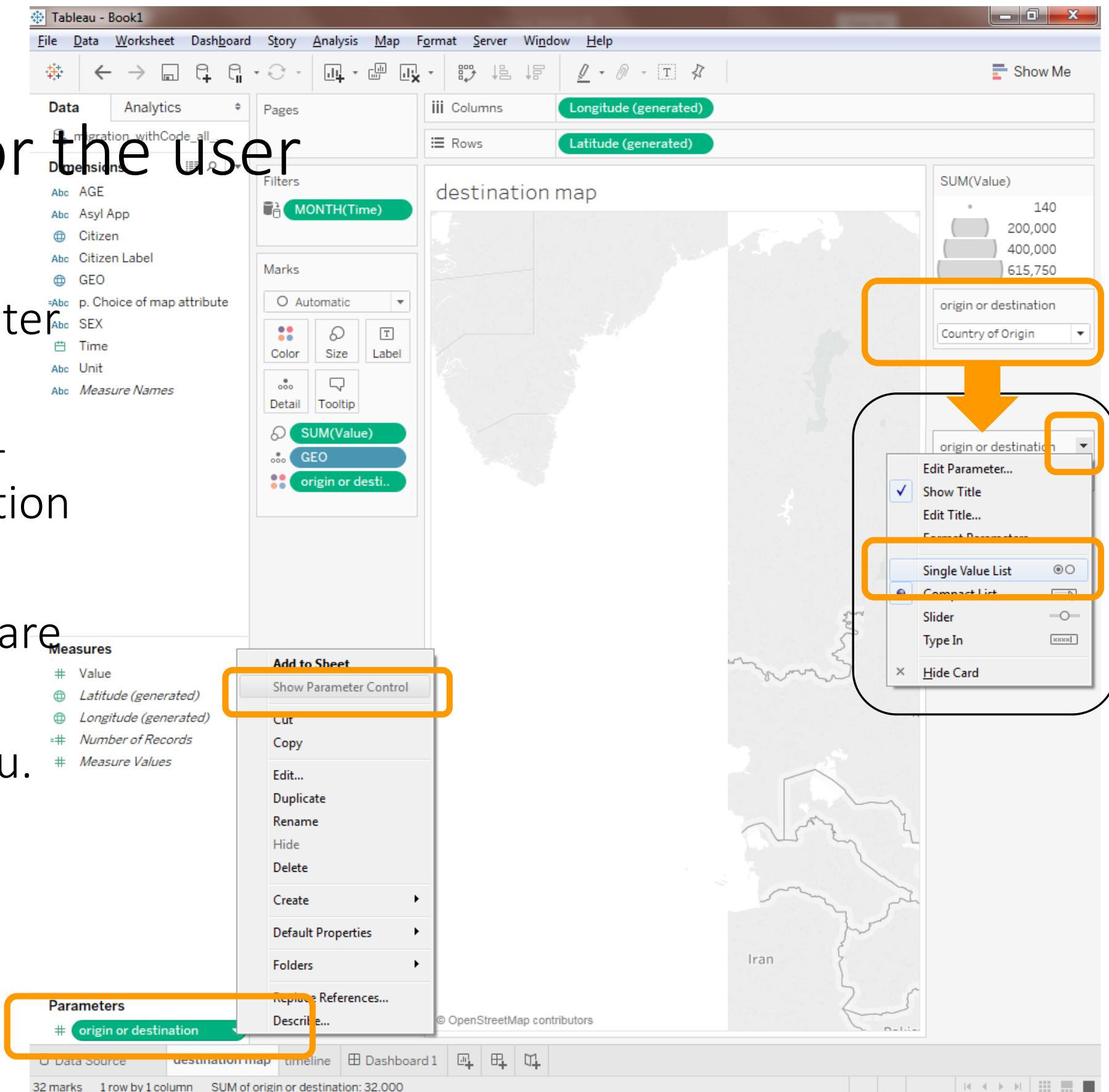
- Our new parameter is now visible to the left under “Dimensions” and “Measures”
- We can now use this parameter for simple “if” statements

The screenshot shows the Tableau interface with the following details:

- Data Pane:** Shows the "migration_withCode_all_..." data source.
- Dimensions:** Lists AGE, Asyl App, Citizen, Citizen Label, GEO, SEX, Time, Unit, and Measure Names.
- Measures:** Lists Value, Latitude (generated), Longitude (generated), Number of Records, and Measure Values.
- Parameters:** A green parameter named "origin or destination" is listed in the bottom right corner of the pane.

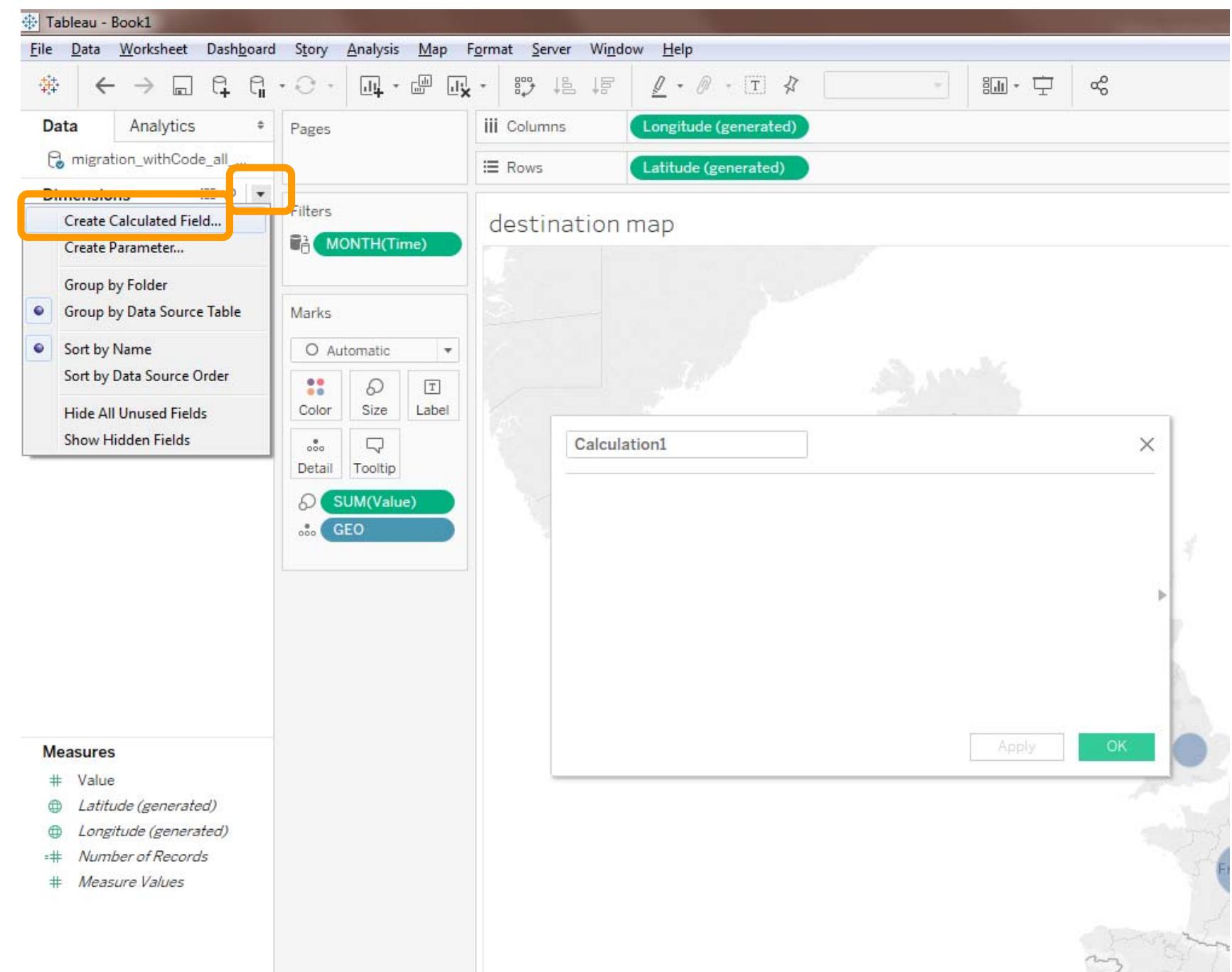
display the parameter for the user

- We want to make our new parameter to be visible to the user.
- In the clicking the parameter drop-down menu will provide us the option to “Show Parameter Control”
- By default, the parameter options are offered via a drop-down menu.
- Change this to a radio button menu.



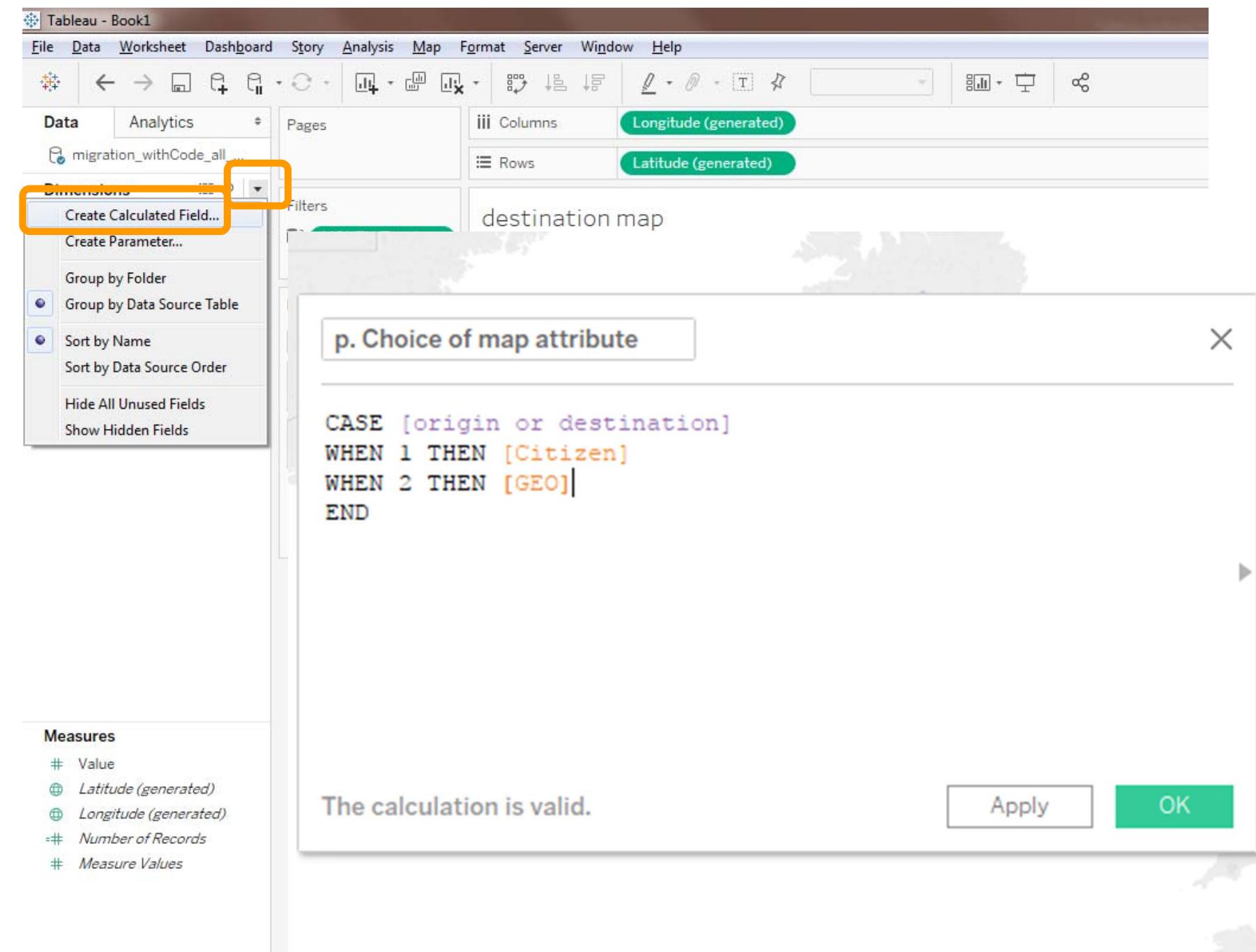
using parameters in calculated fields

- Above the “Dimensions” pane, select the drop-down menu to create a “New Calculated Field”



using parameters in calculated fields

- Give the calculated field a meaningful name such as “p. Choice of map attribute”.
- We use “p.” here to indicate that the calculated field makes use of parameters.
- The calculated field will contain a simple if statement to switch between the “GEO” (destination) and “Citizen” (origin) attributes upon user interaction.
- Click “ok”



using parameters in calculated fields

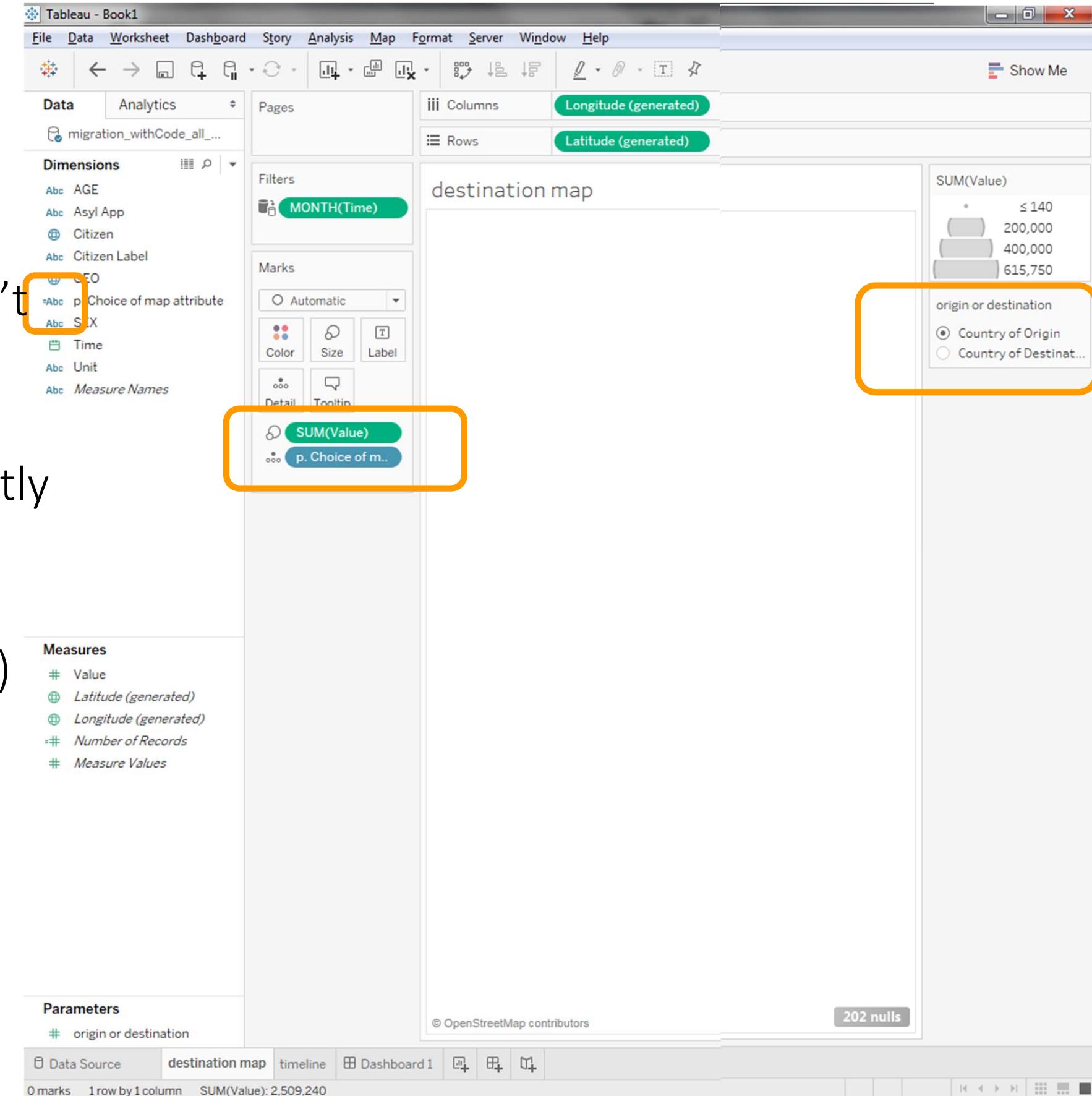
- We now see our new calculated field in the “Dimensions” pane.
- Delete the “GEO” attribute from the Marks pane and insert the new parameter-based calculated field.

The screenshot shows the Tableau interface with the following details:

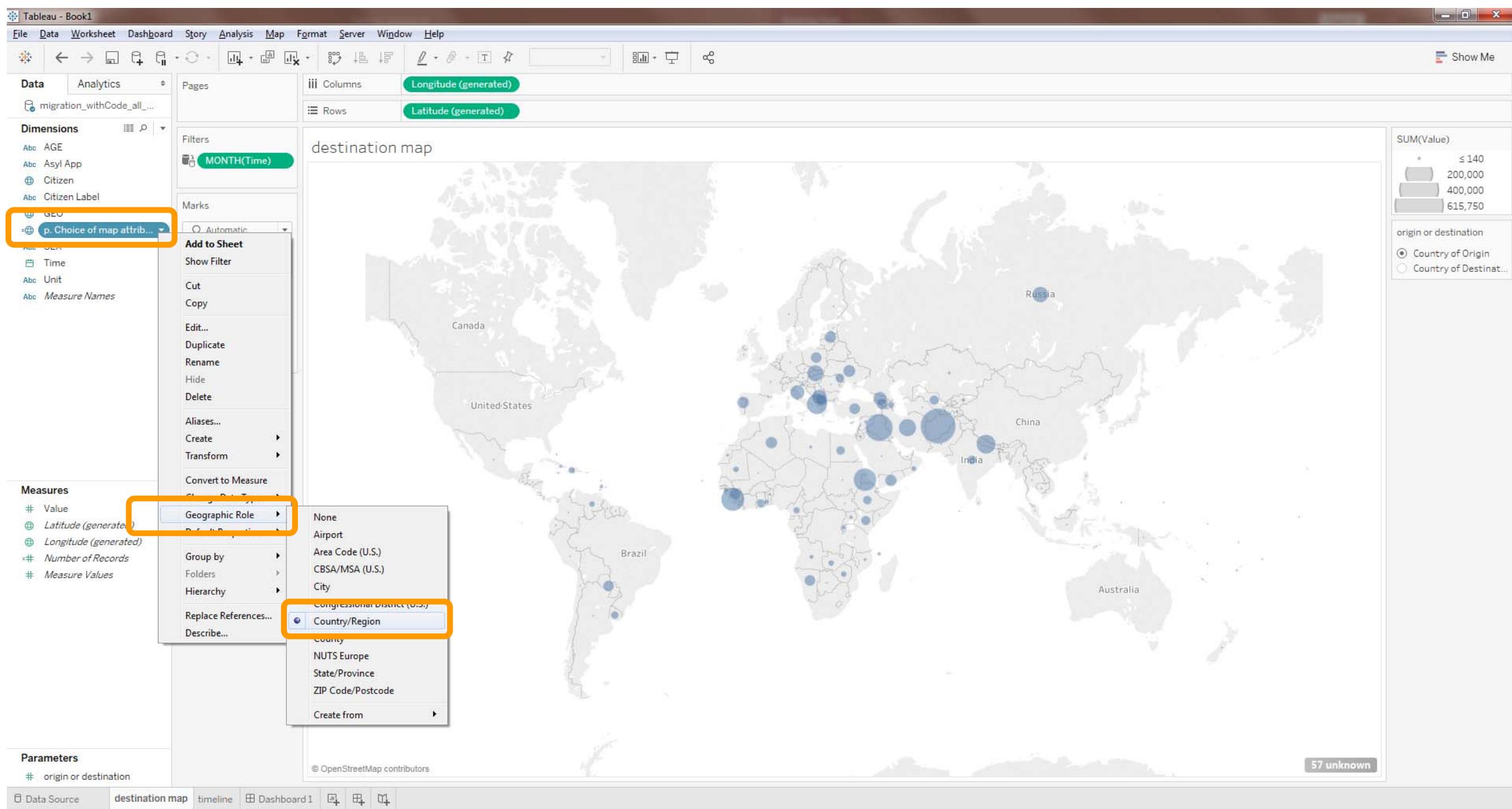
- Dimensions pane:** Shows various dimensions including AGE, Asyl App, Citizen, Citizen Label, and a new dimension named "p. Choice of map attribute" which is highlighted with an orange box and has an orange arrow pointing to it from the list of calculated fields.
- Marks pane:** Shows settings for Automatic marks, with a tooltip for "GEO" highlighted.
- Calculated Fields pane:** Shows two calculated fields: "SUM(Value)" and "GEO".
- Measures pane:** Shows measures: Value, Latitude (generated), Longitude (generated), Number of Records, and Measure Values.
- Parameters pane:** Shows a parameter named "origin or destination".
- Bottom navigation:** Includes Data Source, destination map, timeline, and Dashboard buttons.

not there yet

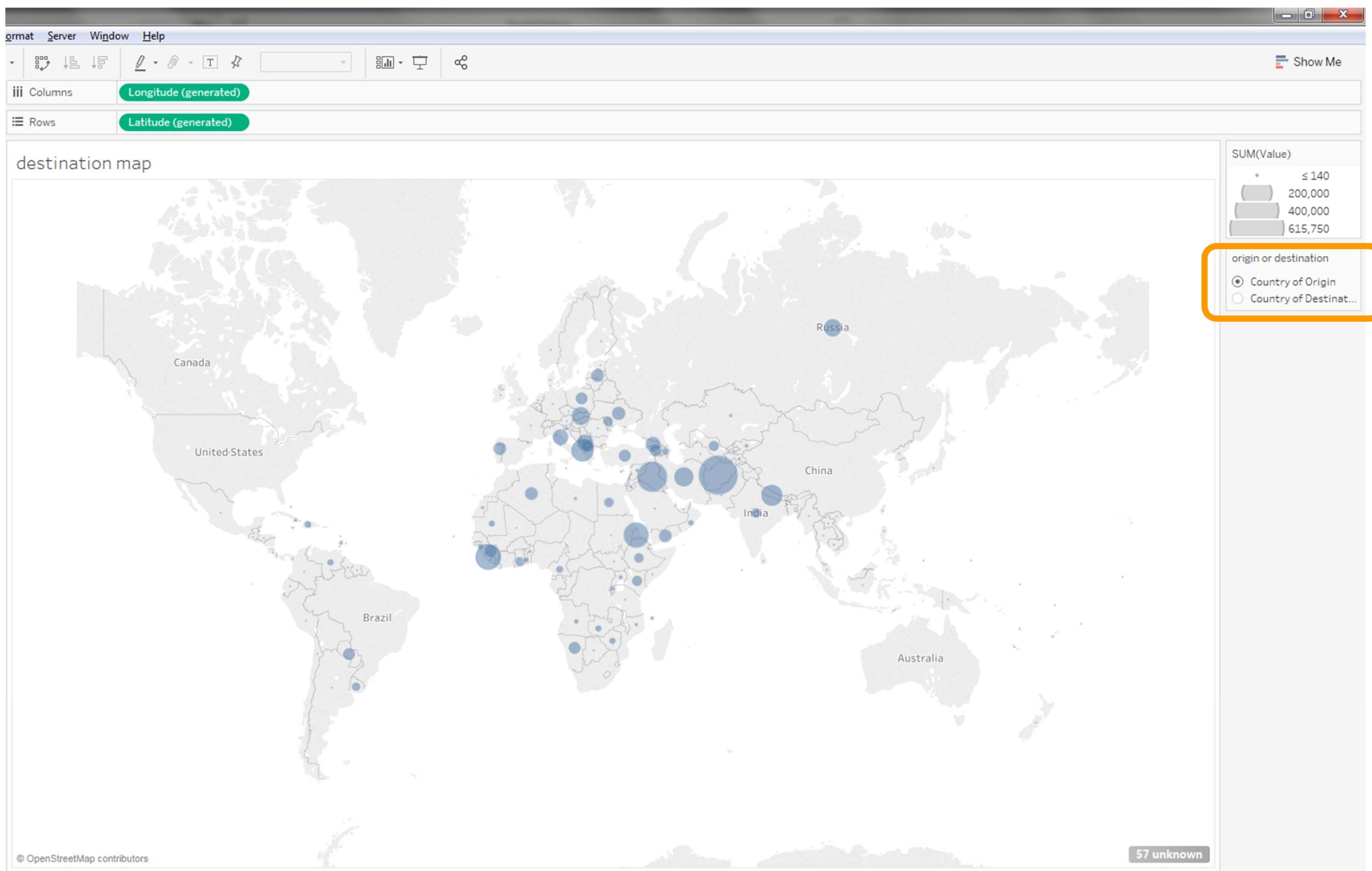
- Everything is prepared, but we won't see any results yet, as the map requires a geographic data type
- p. Choice of map attribute is currently a "String"
- Convert the calculated field into a geographic attribute (see next slide)



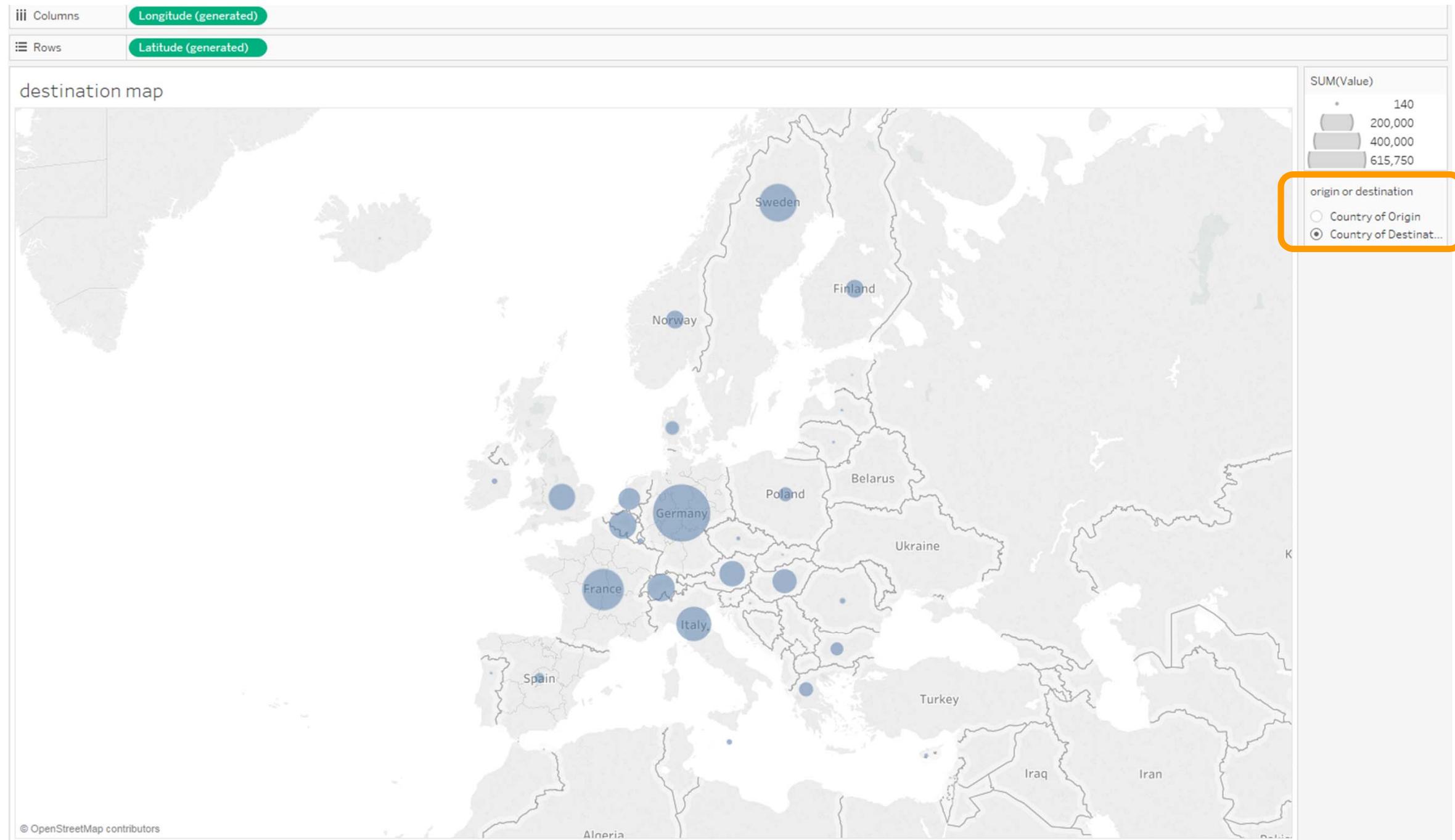
convert calculated field to geographic data type



with country of origin selected...

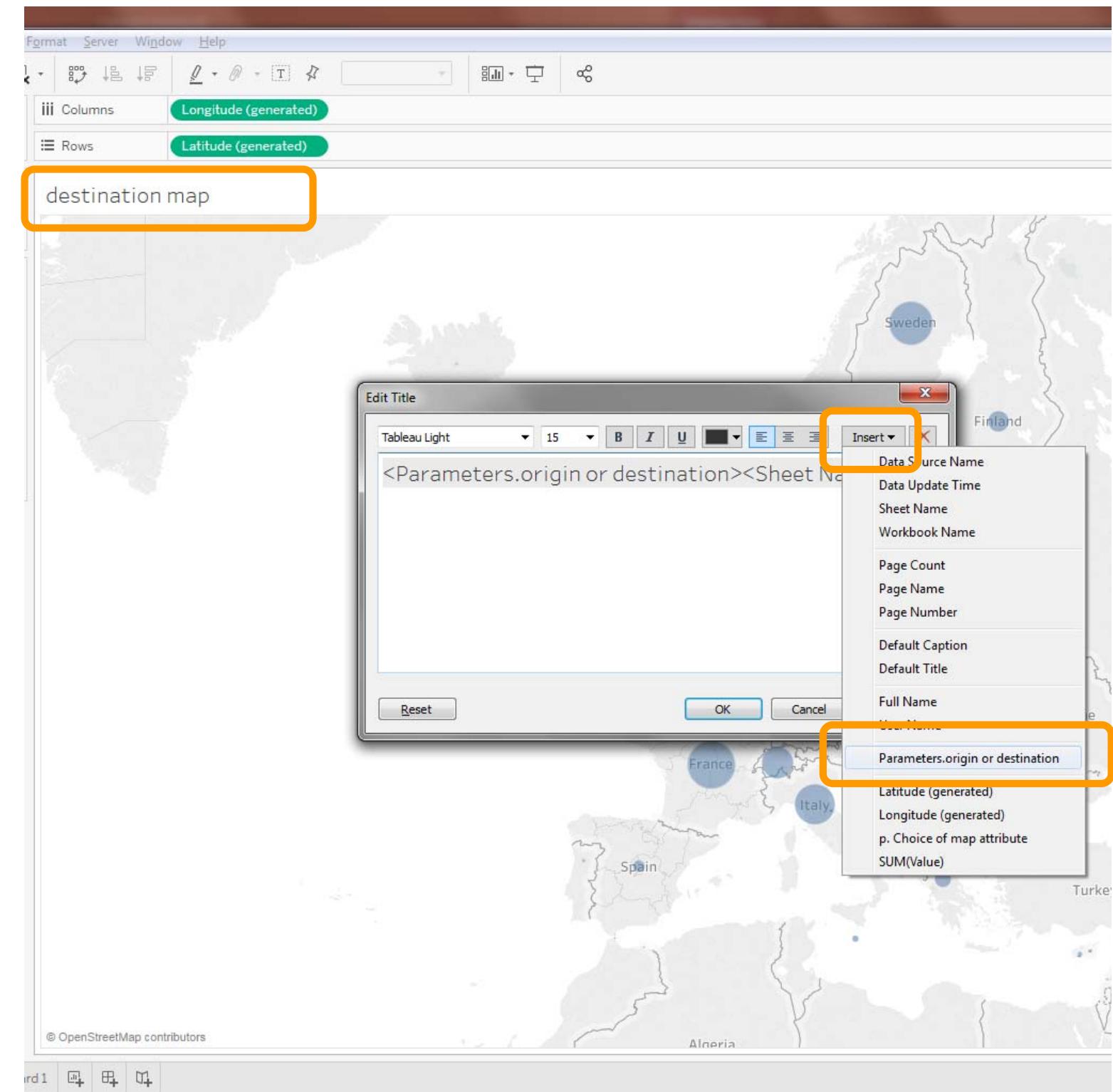


with country of destination selected...



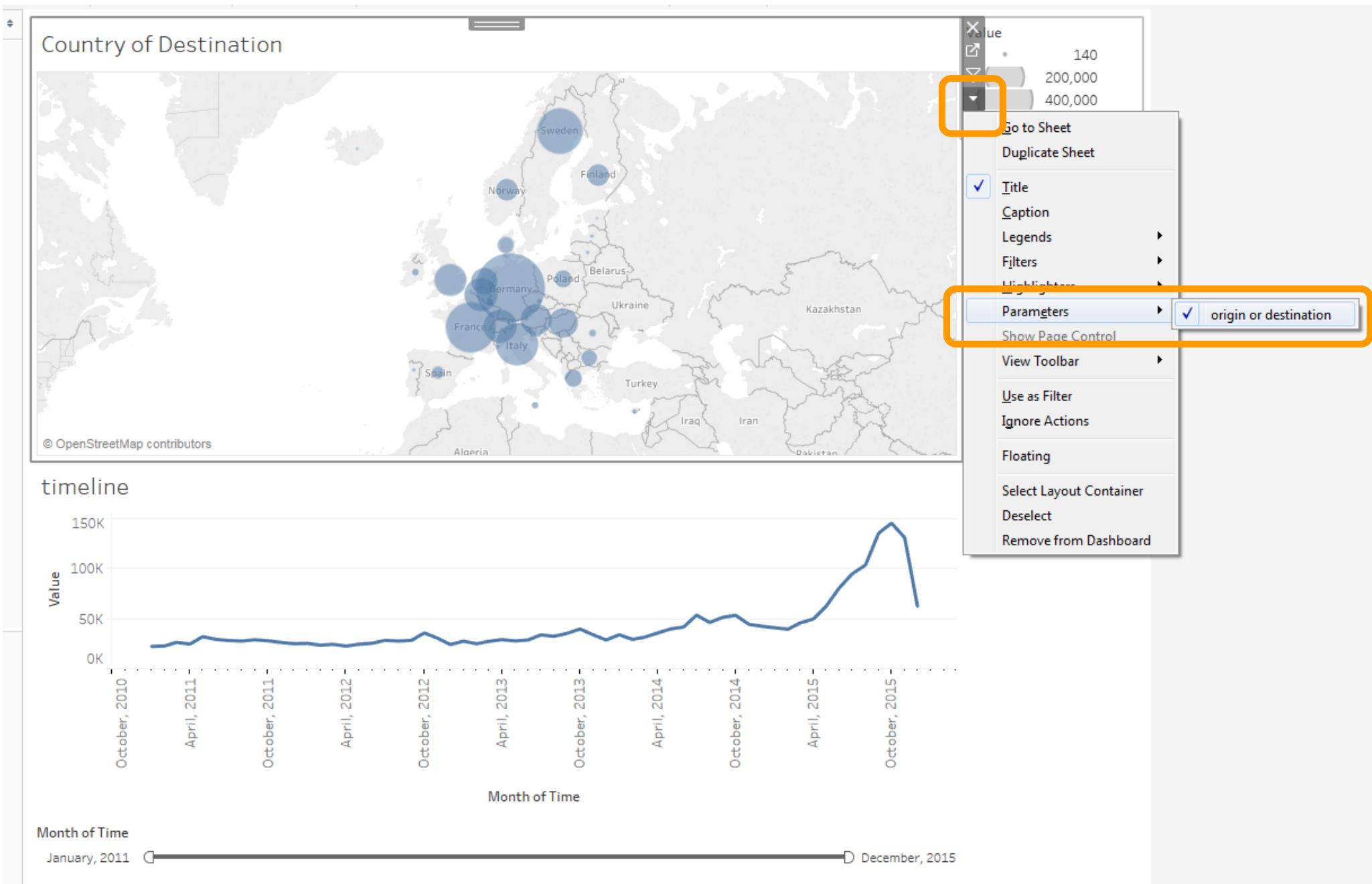
make sure the title of the map changes with the parameter option

- Double click the title of the worksheet
 - Select “Insert”
 - Select the parameter
 - Click apply
-
- The title of your worksheet should now change with the selection of the parameter radio button.



insert the new parameter-based map into your dashboard

- Style the parameter option element as you like.
 - Radio button
 - Drop-down menu



activities

- Apply the “origin or destination” parameter to change the colour of circles in the map depending on the selected option.
- For “origin” the circles should be blue
- For “destination” the circles should be orange
- Bring comparisons of gender (“SEX”) into your visualisation dashboard
 - Experiment with area charts
- Try and support a side-by-side comparison of destination countries and countries of origin.

more resources on timelines in Tableau

- How to make a timeline in Tableau, Ryan Sleeper
 - <https://www.ryansleeper.com/how-to-make-a-timeline-in-tableau/>
- Making timeline charts in Tableau step-by-step
 - <https://umarthejourno.com/2017/03/02/making-timeline-charts-in-tableau-step-by-step/>
- Creating a Gantt Chart
 - http://onlinehelp.tableau.com/current/pro/desktop/en-us/buildexamples_gantt.html

