QGIS Practical 5: Storm Track Map

In this practical exercise, you will build on the learning from the previous practicals and create a Storm Track Map.

A Storm Track Map shows the direction and indicative path of the storm and often includes wind speed zones.

These types of products are very useful as they help understand which areas may be affected the most by the upcoming storm.

The type of data that may be included in such a product depends on the area of interest and the timeline. If we made a product at a very small scale, so that it is very zoomed out and covering a good portion of the ocean, we would not want to add too much detail in each of the countries shown on the map. The rule to make an effective communication product is to make it as clear as possible.

Have a look at this example!
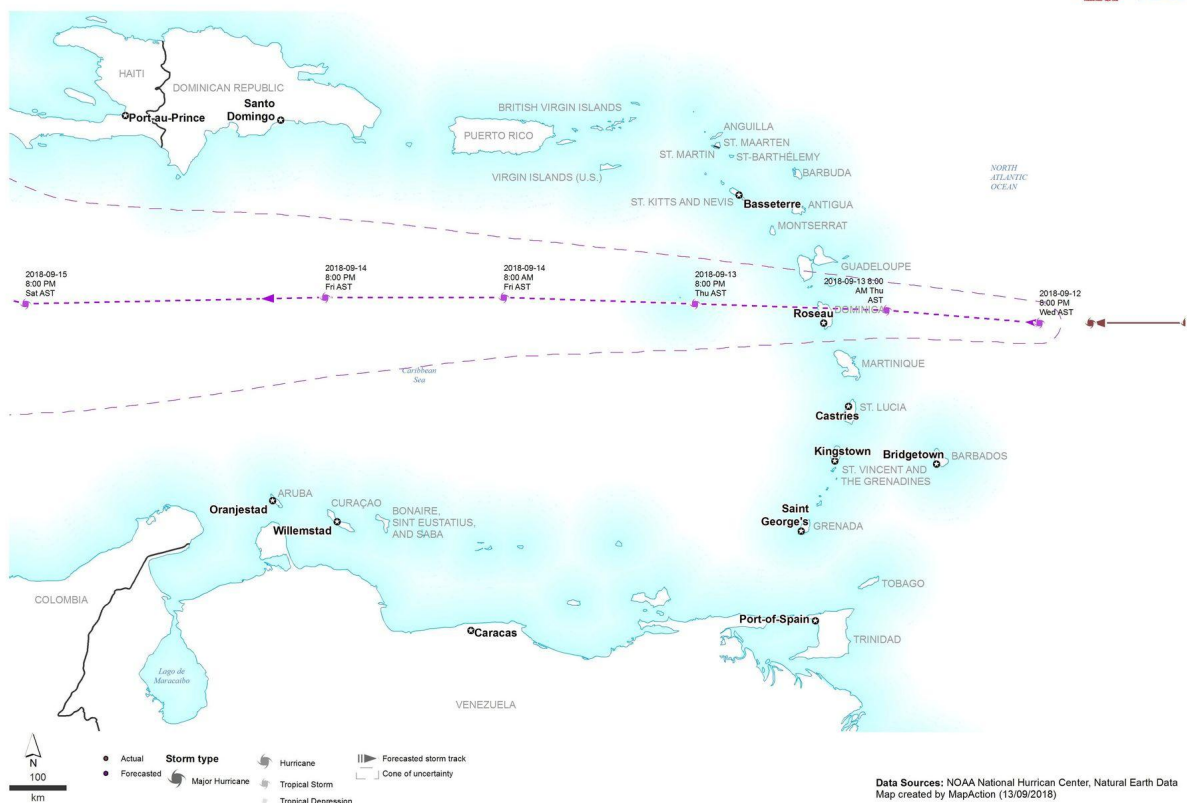
1.0 Planning your map project

As you start working on your product, it is a good idea to take a step back and reflect on what you want the final product to look like. Also remember, that map projects are often iterative. You may start with a simple product, that you can then use as a base for the next versions, or other products altogether.

Here are some points to take into consideration as you start your work:

- Who is this product for?

- What data do I need?

  - In this case, we will need the administrative areas, the storm track, and the settlements.

- What is the status of those datasets? Are they fit for purpose? Is any cleaning necessary?

  - Always open the datasets and inspect them to make sure they are indeed fit for purpose. You can start by opening them to do a visual check, but it is also always a good idea to open the attribute table and have a sense of how the information they contain is organized.

- Is there anything I should warn my final user about? Anything about how to read the map, any caveats regarding the data, its use, and its shareability?

2.0 Getting Started

1. Start a new project and add the following datasets:

   o The Admin 0 layer: wrl_admn_ad0_py_s0_un_pp_worldcountries in GIS\2_Active_Data\201_admn

   o The Settlements layer: wrl_stle_stl_pt_s0_naturalearth_pp_settlements in GIS\2_Active_Data\213_stle

2. As you can see, these are world datasets. Use the zoom-in feature to focus on the Caribbean region.

3. Spend some time choosing the appropriate symbology for the various datasets you added. You can refer to Practical 2 for symbology methods for the settlements data, keeping in mind however that for this product, **we will only want capital cities**, and to Practical 1 for visualising Admin 0.

   o You will likely want to choose a light color for the countries, and you will want to label them with their name, potentially in capital letters

   o For capital cities, choose an appropriate point symbol, and label them appropriately, using lowercase letters.

4. Take a final moment to look at all of your symbology.

   o Are you completely happy with how everything looks? Is the information clearly displayed? Can you differentiate between different items on the map?

   o Make your final adjustments now. Remember to check and adjust the order of the layers. Should a layer be on top of another?

5. Before you move on to the next step, take a moment to save your project as **"Storm Track_Hurricane_Gemma_YYYY_MM_DD" in** GIS\3_Mapping\33_Map_Projects.

   o Adding name and date helps other colleagues understand what is in the file at a glance, without having to open the project, and also helps with currency, in case you want to make updated versions.

3.0 Preparing your map workspace

Now that we have our base map, we will:

- Add the storm track, and choose the right symbology for each of its parts

- Take a second to look at the aesthetics of the map in our workspace, before

- And finally, work on the Map Layout, which means we move out of the QGIS workspace and into the document Layout area, where you can decide how the final map document will look like.

3.1 Adding the Storm Track

A storm track dataset is often composed of several datasets:

- Position points, predicted and actual, associated with dates and times

- A direction line

- Wind swaths: these are intended to show the expected size of the storm and the areas potentially affected by sustained winds of tropical storm force (34 knots), (50 knots) and hurricane force (64 knots).

1. We have the dataset downloaded from the NOAA website, but we have not activated it - meaning we still have the original file in the folder GIS\1_Original_Data.

2. Navigate to the correct location, and add to the map, by clicking or dragging, the following datasets to the map project:

   a. Dataset ending with _lin
   b. Dataset ending with _pts

  c. Dataset ending with _windswath

3. Take a moment to visually inspect the datasets, and open their attribute tables. This is particularly important when we are getting ready to symbolyze, as we can now take note of which fields in the table hold the most interesting information, and what we may want to use in our symbology strategy.

4. Activate the datasets: this means right-clicking on each, selecting **Export**, navigating to the correct Active Data Folder - for example 207_event, and renaming it according to the naming convention: `[extent]_[theme]_[source]_[free text].[ext]`

   For example: reg_evnt_str_py_s0_pp_noaa_HGemma_windswath.shp

   Activating the dataset is important as it allows us to work with the data, even edit and modify it while maintaining a clean copy, in case it gets corrupted. Renaming it helps associate the dataset with some immediately readable metadata that will make it easy for us and our colleagues to understand what the data contains at a glance.

## 3.1.1 Storm position symbology (point)

1. Right-click on the storm point layer to open its **Layer properties**, and access its **Symbology**
2. Choose **Categorized** in the upper menu - as it may be interesting to view the points differently based on their storm categorization and select **STORMTYPE** as Value.
3. Now, click on the symbol to open the point symbology menu. We need a symbol that will help the audience understand that it is a storm location. Click on **Simple Marker**, underneath "Marker" in the symbol's settings.
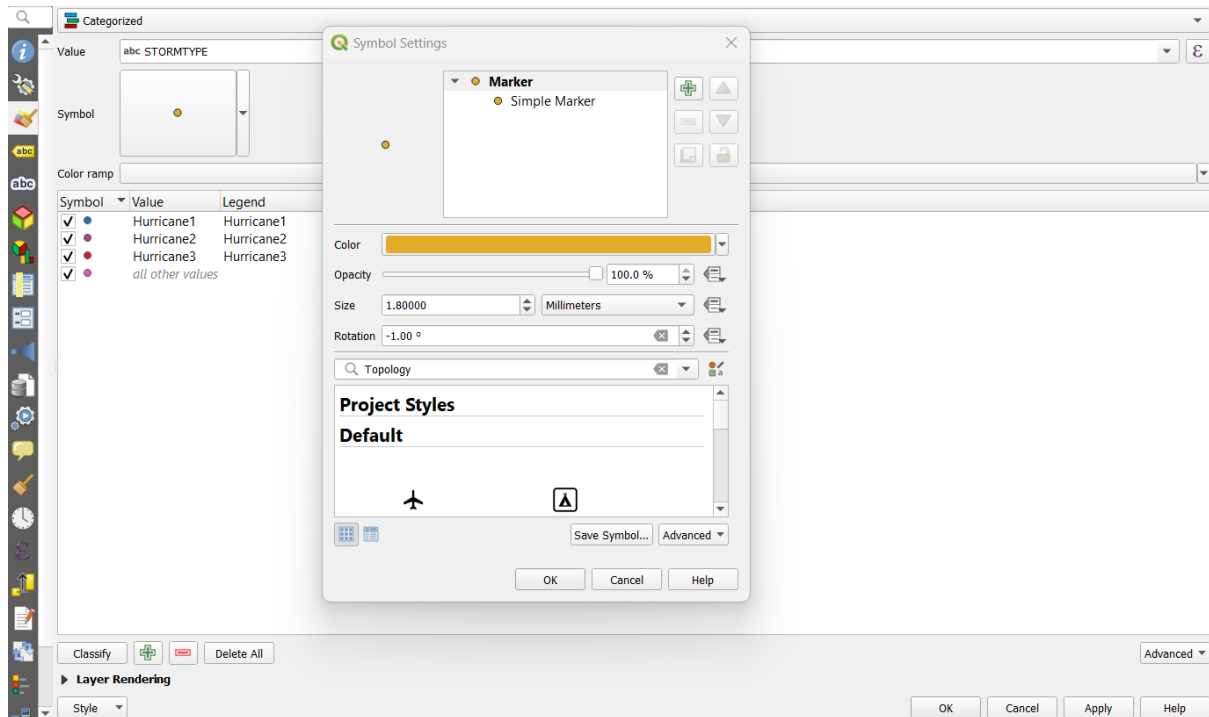
4. Click on the first dropdown menu, **Symbol layer type,** and select **SVG Marker.**
   Scroll all the way down until you see the SVG browser area, with all the symbols on the right.
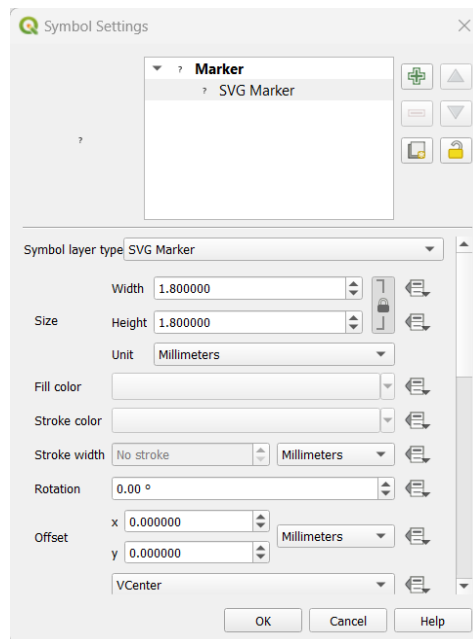

5. At the very bottom of the SVG Groups menu, find the option wind_roses, and select the first 1.
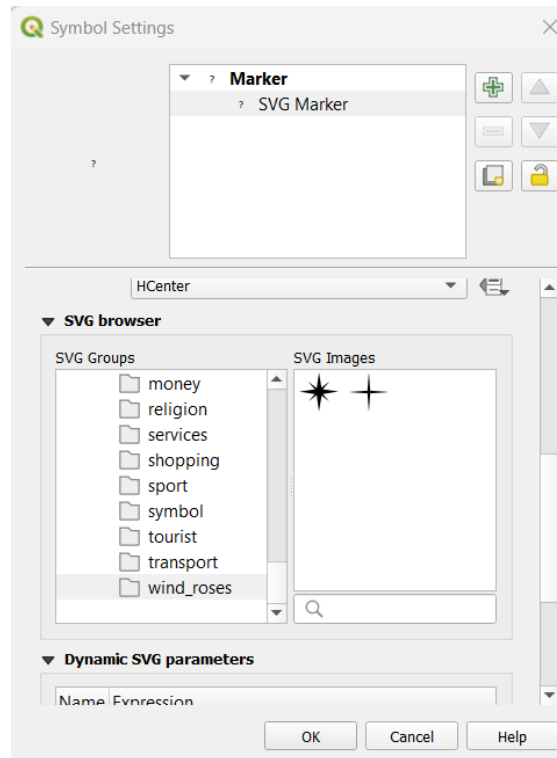
6. Back to the top of the menu, adjust the symbol size so that it is 6.

7. Now, at the very top of the **Symbol settings** menu, click on the green plus to add a symbol. We want the circle, and that is what should be given to you by default. Click on the new symbol **Stroke color** and choose **Transparent Stroke** to make the outline invisible. You can now click **OK**.
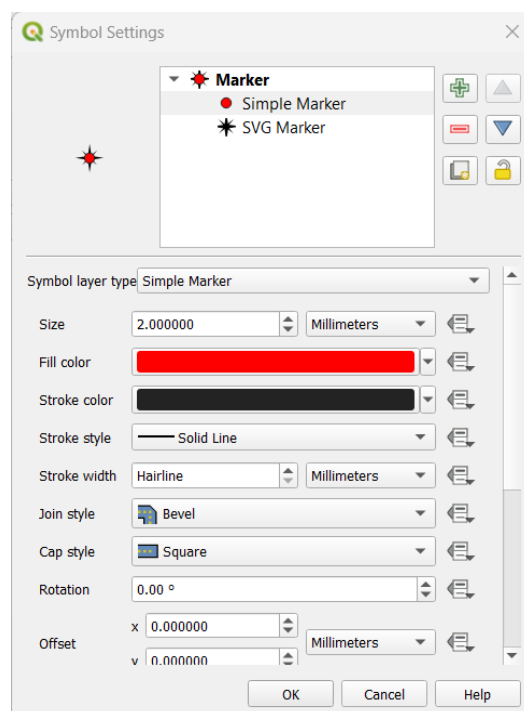

8. Now that you have the symbol, you can click on every single symbol in each category to pick a different color in order of magnitude - for instance
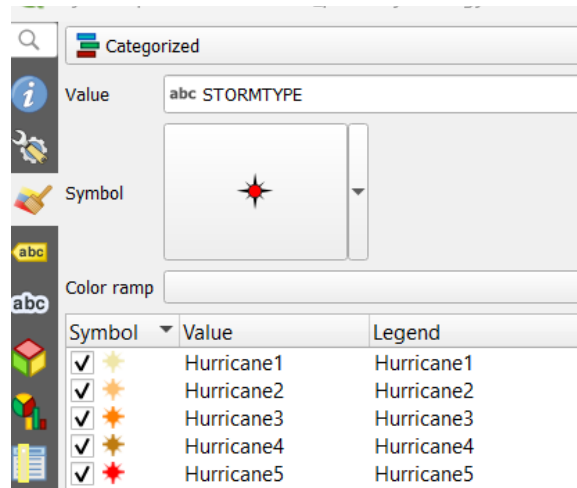
9. Now, let's take a look at the label. We know the attribute table contains information about the date and time for each of these points, and it would be great to have that shown on the product. Have another look at the attribute table to see which field could be used as a good label. As we don't have any field that contains a date format that is easy to read on the map, we will make a label combining different fields. Choose **Label** from the left-hand panel in the **Layer properties.**

10. Choose **Single Labels**, and in the upper right-hand corner, click on the expression 𝛆 symbol
to open the **Expression Dialog**
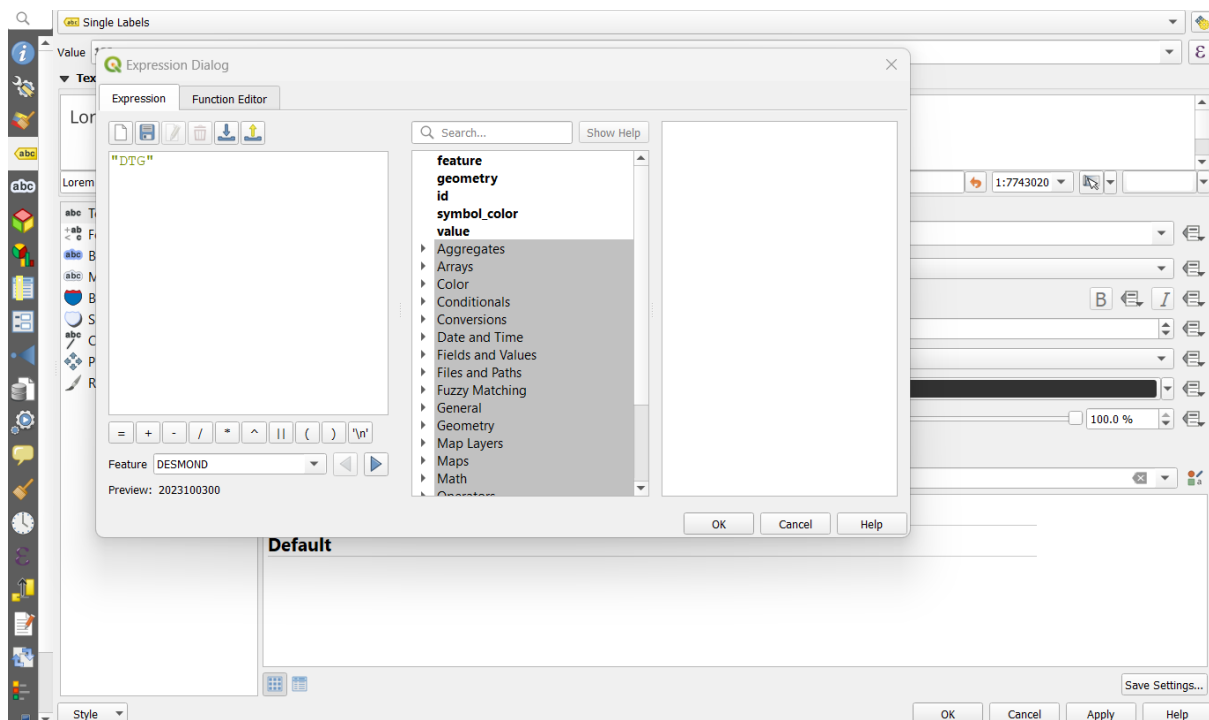
12. The middle section of this dialog has all the fields and operators that you need to compose an expression. For instance, if you click on the arrow next to the option **Fields and Values**, you will find all of your attribute table fields. To select a field, you can double-click, and it will show on the expression window on the left-hand

side. Underneath the expression window on the left, you will find some common operators. The expression we want to build is the following:

"DAY" || ' ' || "MONTH" || ' ' || "YEAR" || ', ' || 'Time: ' || left("HHMM" ,2)

The || is used to concatenate strings. This expression means: add a zero before the day, add a space, add the month, add a space, add the year, add a comma and a space, add the text 'Time: ', which includes a space, and finally, take the first 2 numbers of the hours' field, as we don't need the detail of the minute.
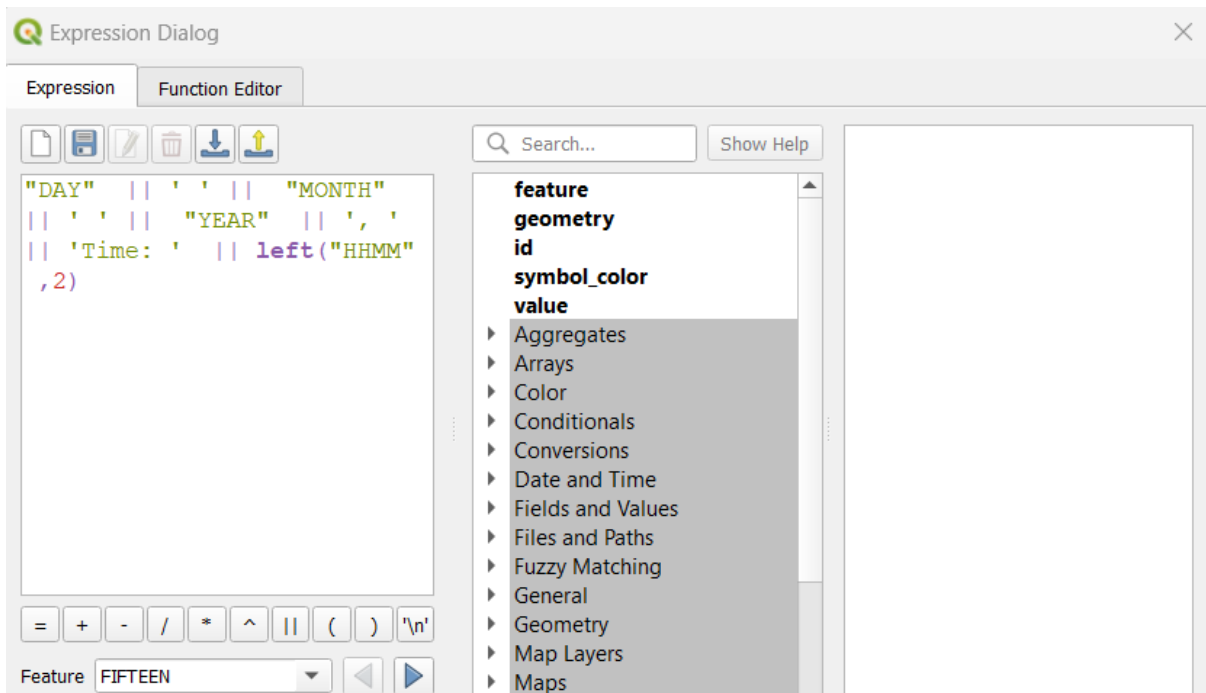
13. You can now **OK** this, and go into choosing fonts and colors for these labels. Make sure they don't get confused with the other labels we have on this map. For example, I have chosen to have mine slightly smaller than the other labels, and in italic.

3.1.2 Storm track symbology (line)

The storm line also has information about what type of storm it is in the various sections. However, as we already have quite a bit of detail in the points, we can choose a gentle symbol, that adds consistency to the image without creating too much noise.

1. Right-click on the line layer to open its **Layer properties**, and find the **Symbology area**.

2. In the upper dropdown menu, choose **Single Symbol.** Now, from the options below, choose **Dash black**, and Apply to see how you like it.

3. Opening the symbology menu again, reduce the line width to 0.46, and choose perhaps a darker gray color, rather than black to soften the contrast. **Apply** and **OK**!

3.1.1 Wind swaths symbology

Wind swaths are huge and risk occupying most of the map. We need a symbology strategy that will help convey the information without covering everything else.

1. Right-click on the wind swaths layer to open its **Layer properties**, and find the **Symbology area**.

2. In the upper dropdown menu, choose **Categorized**, and **RADII** as **Value** field.

3. At the bottom left corner, click on **Classify** to get all the categories showing.

4. Double-click on the first symbol, representing areas with winds of up to 34 knots. Click on **Simple Fill**, and make the **Fill color** transparent. Choose a color such as yellow for the **Stroke color**, and choose **Dash line** as **Stroke style**.
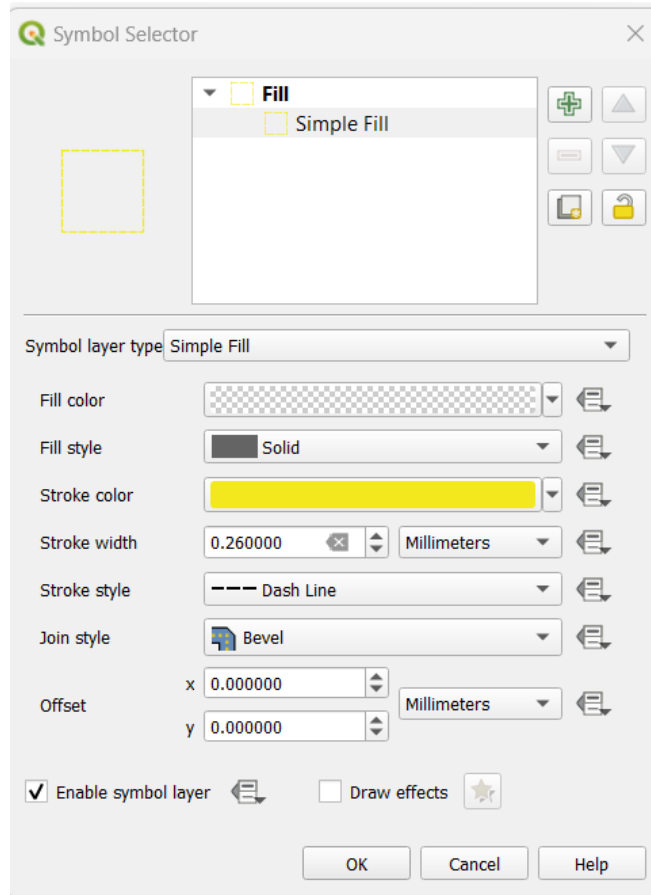
5. Repeat for the other two symbols, choosing an orange, dashed outline for the 50 knots, and a red, dashed outline for the 64.

4.0 Reviewing and final aesthetics

You are almost done! Have a final look, and make sure all the information is clearly visible. Move the cities above the other layers, for example. One final, aesthetic option is to add a feather of water around the islands:

1. Right-click on the wrl_admn_ad0_py_s0_un_pp_worldcountries dataset and choose **Duplicate.** Make sure this copy is at the very bottom of the layers list.

2. Right-click on and find the **Symbology menu** for this duplicate layer in its **Properties** window.

3. At the very top, in the dropdown window, choose **Inverted Polygons**.

4. Click on **Simple Fill** under the **Fill option**, and find in the **Symbol layer type** dropdown the option **Shapeburst Fill**

5. As Gradient colors, choose light blue as the first color, and white as the second, and adjust the distance so that it is about 4 or 5 millimeters.
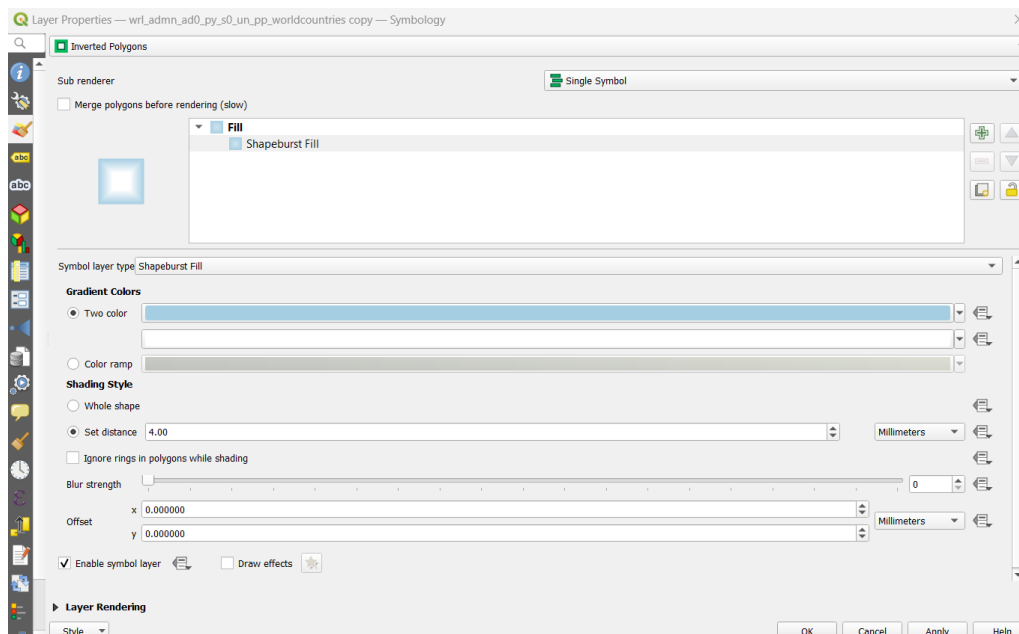
6. **Apply** and **SAVE**!

5.0 Storm Track Map Layout

You are now ready to move onto the Map Layout workspace to create your map document.

1. From the **Project** menu select **New Print Layout**. You will be prompted to enter a title. You can leave it empty and click **OK.**

You can refer back to Practical # 4 to know how the Print Layout Workspace works and how to get to your final product.

6.0 Saving a project

Saving a project allows you to return to it later and continue working on it.

1. From the project menu select **Save**

2. If it is the first time saving the project, use the menu prompted by QGIS to save the project within the folder ..GIS\3_Mapping\33_Map_Projects and change its name to call it "**Storm Track_Hurricane_Gemma_YYYY_MM_DD."**

7.0 Summary

In this session, you became familiar with storm tracks, their format, and related datasets, and explored once again how the choice of symbology can help enhance data interpretation. You have also completed a full map project, that you can now share with colleagues and other responders, and that you can copy and use as a base for your next project.

Well done!