Description

The Hurricane Research Division of the Atlantic Oceanographic and Meteorological Laboratory at the National Oceanic and Atmospheric Administration (NOAA) provides downloadable data sets that describe the official behavior of tropical cyclones (hurricanes) from as early as 1851. An individual data set includes dates, times, category, location, wind speed and size of named and unnamed hurricanes. These data sets describe the official record of each hurricane, referred to as a *hurricane track*.

For this project you will write a program that graphically renders a data set describing the track of a single hurricane over a map of the Atlantic Basin. Your rendering should be performed using SVG in a browser. Your web page should allow the user to select any one of several named hurricanes from a dropdown and dynamically render its track over top of the map image.

Data Sets

Data sets for six hurricane tracks have been converted for you from the original HURDAT2 file format into JavaScript objects and provided in a single data file named `hurricaneData.js`. This file contains track data for six recent hurricanes named Dean, Harvey, Irma, Katrina, Maria and Sandy. When the JavaScript file is included in a web page it defines a global object named `hurricaneData` with property names that match the names of each of the six hurricanes. The value of each hurricane property is an Array of objects representing hurricane track data. Each object is a single data point with properties and values described in the HURDAT2 file format. Attributes for a single data object include: latitude, longitude, maximum wind speed (in knots), and radii of the cyclone (in nautical miles) at three wind speeds (34 knots, 50 knots, 64 knots) for its four quadrants (northeast, southeast, southwest and northwest). As an example, one data point for one hurricane appears as follows.

```
{"date":"20050828", "time":"0600", "ident":"", "status":"HU", "latitude":"25.2N",
"longitude":"86.7W", "windMax":125, "pressureMin":930, "radii34kt":[160, 160, 125, 140],
"radii50kt":[100, 100, 75, 100], "radii64kt":[ 75,  75,  50,  75]}
```

Atlantic Basin Map

A map of the Atlantic Basin within which all of these hurricanes were formed is provided by the New Jersey Office of Emergency Management in a file named `chart_1275x825.png`. As its name suggests, the size of the image is 1275 pixels wide by 825 pixels high. This map image will form the base of your SVG visualization.

Getting Started

You may start your project using the files `Project3_start.html`, `hurricaneData.js` and `chart_1275x825.png`. The file `Project3_start.html` sets up a basic HTML file with an `<svg>` tag that preloads the map image of the Atlantic Basin as the first graphic SVG element. It also loads the data in `hurricaneData.js` using a `<script>` tag, which defines the global hurricaneData object. Also included as comments in the `Project3_start.html` file is a function that maps numerical values for latitude and longitude into pixel coordinates of the `chart_1275x825.png` image. You may use this function to perform that conversion.

Requirements

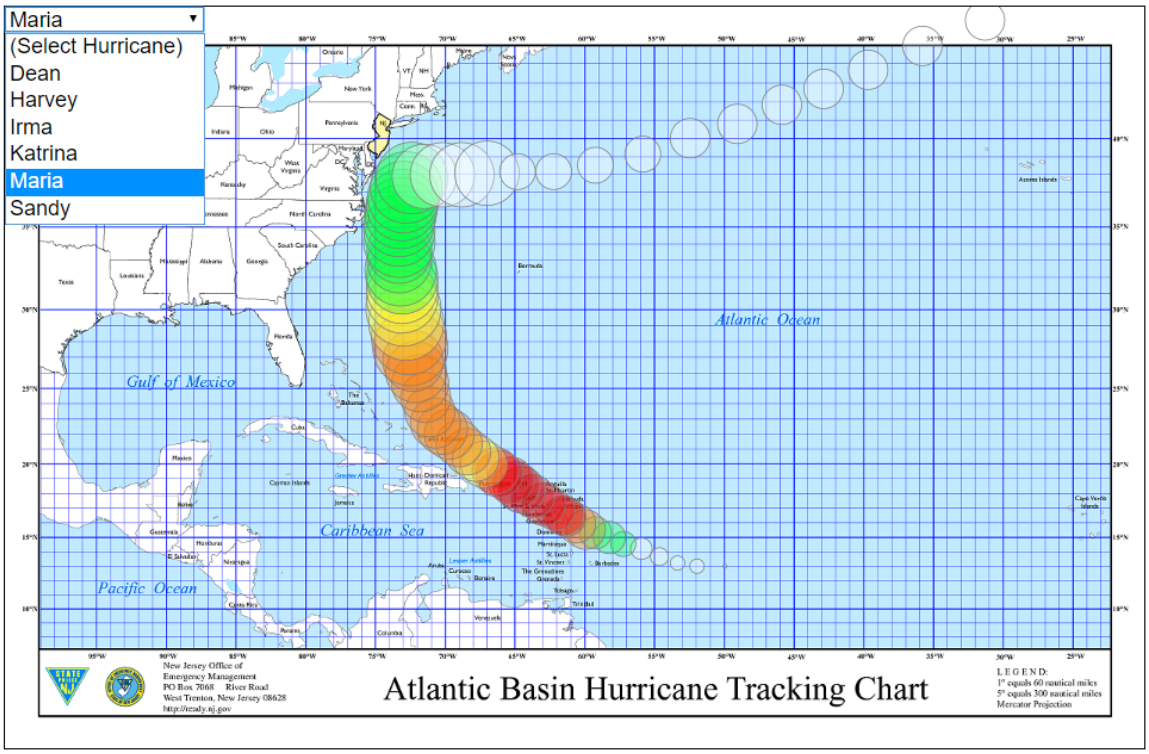
You program should do the following.

- Upon loading the page it must display the map of the Atlantic Basin as an SVG image.
- Upon changing the selected option from the select dropdown (change event), your program must:
  1. Remove all previously generated SVG elements illustrating a hurricane track
  2. If a hurricane is selected, generate a new series of SVG elements illustrating the track of the hurricane.
- The hurricane track must create one graphical element for each data point in a track.

- Each SVG element must illustrate the state of the hurricane at a data point, including location (latitude, longitude), size (as indicated by any one radius), and category (as measured by the Saffir-Simpson Hurricane Wind Scale, values 1 through 5). In your program comments explain how you chose to represent hurricane category and size using your graphical illustration.
- If the data from a single point is invalid (e.g. a negative radius), use a default minimal value so that some small graphical element is created indicating that a point is present.
- All your code must be enclosed in an IIFE (except the global hurricaneData object).

Example

Following is an example of my solution illustrating the hurricane track for Maria. To represent size I chose a single quadrant radius at 34 knots and arbitrarily multiplied by 0.2 for a proportional diameter that I liked. I also changed the fill color to represent hurricane category based on wind speed ranges in the Saffir-Simpson Wind Scale. I chose white as the fill color when the wind speed was less than one of these categories. I also set a level of transparency for all fill colors so that overlapping circles are partially visualized.



Hints

- The global JavaScript `parseFloat(…)` method will parse a floating point number from the start of a string and ignore any trailing non-numeric characters. For example `parseFloat("80.1W")` will return the number 80.1, ignoring the trailing "W".
- The currently selected value is available as the value property of the <select> element. There is no need to inspect the <option> child elements of the <select>. Simply get a reference to the <select> element object and access its value property.
- Write separate functions that delete elements making up a hurricane track illustration and create elements for a new illustration.
- Remember that the "children" property of an HTML Node is a "live" HTMLCollection object. This means that it will always reflect the current state of the DOM. If you delete SVG Elements by looping over the "children" HTMLCollection, delete from the end of the collection to the beginning.