**Project Execution Plan**

**Overview**

Based on the data from 10 NOAA environmental buoys located in western Atlantic region, the main aim of the project is to investigate the individual buoy data as well as cross investigate the data of different buoys to identify major climate events such as hurricanes. An algorithm based on exchangeability test will the basis for this study. Both the data for each individual month from January 2016 till September 2016 and the aggregated period data will be considered for this purpose. The following is what proposed to fulfil the project purpose

**Data pre-processing**

The available data includes a considerable amount of irregularities such as missing data for long period and jumps. To address those issues, it is proposed that the data for each individual month will be examined. If more than 20% of the sensor data is missing, the sensor will be dropped, otherwise the missing/defected values will be imputed using a method based on k-NN

**Anomaly Detection**

It is proposed to cross investigate the data between different buoys in addition to the aggregated data for each buoy. For the cross investigation, the data will be analyzed monthly to evaluate the buoy similarity pattern evolution across the whole study period. In this case, each buoy will represent a specific class and a data label will be added.

For the aggregated data, no class label will be considered and the data cluster mean will be considered for strangeness calculation

**Detection Algorithm**

Based on the basic algorithm introduced in the baseline model, the following improvement are proposed:

* Testing the performance of different martingale functions (plug-in martingale)
* Investigate the possibility to develop a change detection measure

**Deliverables**

The final project deliverable will be a website that includes

* A description of the project and the data
* Link to a repository for the project source code and files
* Sample data analysis with corresponding illustrations