Guide to Run the Program

* The program works with a numbering system, in general most functions are called from the master script (“01\_01\_Master.R”). Any files called from this contain the prefix (“02\_XX\_XXX.R”). The first set of XX’s dictate where in the program that function is called from.
* A number of libraries are required to run the program which are listed in the first line of the Master file. These can be installed from R packages.
* The files and their respective purposes are listed below. To run the entire program merely highlight the entire list and press cntrl + Enter.

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| File Name | Description |
| 01\_01\_Master.R | The main file from which all scripts are run. |
| 02\_01\_Get\_Data.R | Collects storm data from the csv files downloaded from the internet of historical storm events and stores them in the variable “storms”. |
| 02\_02\_Graph\_Style.R | Returns the styles for maps which are used for plotting later in the program. These 3 different styles vary in how far zoomed in they are and other factors like that. |
| 02\_03\_Removenegtopos.R | When the Longitude splits from -180 to +180 plots contain a peculiar straight line across the globe. This merely splits the paths for plotting. |
| 02\_03\_ZoneofInterest.R | The area of interest is the North West Pacific Basin and so this function removes all paths that do not affect this region of the globe. It returns a modified storms variable storms\_inbasin. |
| 02\_05\_Events\_Per\_Year.R | This function returns the number of storm events per calendar year in the historical data. Simply a variable with one column year (1970 ish – 2016) vs number of typhoons in that year. |
| 02\_06\_Events\_Per\_Month.R | Combines all historical typhoons in specific months of the year and returns a variable to see which months contain the greatest number of events |
| 02\_07\_Plot\_Events\_Per\_Month.R | Plots various bar-plots of events per month. Some parts of this function are called later when generated data is being plotted. |
| 02\_08\_Typhoon\_Birth.R | This locates the genesis point of typhoons and returns a dataframe for plotting in the next function. |
| 02\_09\_Plot\_Birth\_Rates.R | Plots a statistical density plot of the genesis point of all events in that calendar year. One png for each year since 1970 ish. These can then be combined with ffmpeg to form a video. Takes a long time so don’t run every time you run the program! |
| 02\_10\_Typhoon\_BirthM.R | Similar to 02\_08 except the genesis locations are split into respective months instead of years. Plus the ENSO signal of that month is also assigned to it. |
| 02\_11\_Plot\_Nino\_BR.R | Plots a stat\_2d of months and their typhoon genesis location. However these months are split dependent on their ENSO signal. Just to see if ENSO signal and the Month of the year makes a difference on genesis location (it does) |
| 02\_12\_Plot\_Storms.R | Plots the storm paths – one is just the basin plot and the other the whole world plot. |
| 02\_13\_Storm2Polar.R | Converts the storm paths to polar coordinates with origin 95 Long and 0 Lat. |
| 02\_14\_Plot\_Polar2.R | Plots various graphs to do with the new polar coordinate system – I recommend reading the comments in this file. |
| 02\_15\_Determine\_8lines.R | Not really part of the program but has 4 straight lines in polar vs 4 of the curved typhoon paths in the polar plots. |
| 02\_16\_Serial\_Correlation\_Test.R | Just to test whether the number of events per month is independent of dependent on # previous month’s events. |
| 02\_17\_Poisson\_Dist.R | Fits a poisson distribution to the number of typhoons generated in a given year. This is later used to generate a random number of events for a year. |
| 02\_18\_Create\_Profiles.R | This uses historical data of the distribution of typhoon events over the year. Each year displays the fraction of typhoons that occur in each respective month. This is then used to distribute the events predicted by the Poisson distribution over the months of the year. |
| 02\_19\_Poisson\_Generation.R | Generate events from the Poisson distribution created in 02\_17. |
| 02\_20\_Kernel\_Density.R | Use kernel smoothing to create a probability model for genesis location of typhoons. This is then used to predict the starting point of a generated event. |
| 02\_21\_Generate\_Typhoons.R | Uses number of typhoons a year and density kernel to create typhoon events. Output is a dataframe – look at global variables file to see what it contains. |
| 02\_22\_Plot\_Generated\_Typhoons.R | Creates Statistical density maps with historical data as a comparison. (graphs can be found in the report). |
| 02\_23\_Plot\_Gen\_Typhoons\_Births.R | Plot genesis stat\_2d of Months and generated typhoons with historical data as white points behind and visa versa. |
| 02\_24\_Prep\_Regression.R | Create the grid used for typhoon genesis and obtain the parameters/ make models for each 5x5 cell (check output description in variables file). |
| 02\_25\_Create\_Paths.R | Creates the typhoon paths from the models created in previous functions. |