**Table S3a. Statistical significant Meteorological (MF) and its Lagged (LG) Factors in General Additive Modeling (GAM) and Seasonal Autoregressive Integrated Moving Average with Exogenous Variables (SARIMAX)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Meteorological Variables** | **GAM** | | | | **SARIMA** | | | |
| **MF** | | **LG** | | **MF** | | **LG** | |
| F-value | p-value | F-value | p-  value | z-value | p-value | z-value | p-value |
| Flood  Occurrence | 1.737 | 0.08 | 2.80 | *0.01\** | -0.60 | 0.55 | 1.91 | *0.05\** |
| Total  Rainfall | 0.846 | 0.45 | 4.77 | *0.01\** | 0.75 | 0.46 | 1.41 | 0.16 |
| Maximum  Temperature | 4.459 | *0.00\** | 3.93 | *0.02\** | 1.74 | 0.08 | 0.84 | 0.40 |
| Minimum  Temperature | 0.886 | 0.44 | 2.00 | 0.16 | -2.62 | *0.01\** | 0.63 | 0.53 |
| Average  Temperature | 1.597 | 0.19 | 1.98 | 0.10 | 0.81 | 0.42 | 46.64 | *0.00\** |
| Relative  Humidity | 4.091 | *0.04\** | 11.28 | *0.00\** | -0.76 | 0.44 | 0.39 | 0.70 |
| Average Wind  Speed | 1.605 | 0.15 | - | - | 2.49 | *0.01\** | - | - |
| Minimum Wind  Direction | 3.144 | 0.09 | 1.59 | 0.13 | 1.36 | 0.17 | 1.01 | 0.31 |
| Maximum Wind Direction | 1.165 | 0.28 | 1.64 | 0.18 | -3.03 | *0.00\** | - | - |
| Southern Oscillation Index | 7.851 | *0.01\** | 20.04 | *0.00\** | 0.16 | 0.87 | 1.35 | 0.18 |

*\* statistically significant variables*

**Table S3b. Variable Importance of Random Forest and Gradient Boosting in Meteorological factors (MF) and its corresponding lags (LG).**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **METEOROLOGICAL VARIABLES** | **METEOROLOGICAL**  **FACTORS (MF)** | | | **LAGGED METEOROLOGICAL FACTORS (LG)** | | |
| RF | | GB | RF | | GB |
| %Inc  MSE | Inc  Node | Relative Contribution (%) | %Inc  MSE | Inc  Node | Relative Contribution (%) |
| Flood  Occurrence | 9.56 | 1.56 | 1.73 | 10.01 | 1.79 | 1.88 |
| Total  Rainfall | ***15.16*** | 9.24 | ***11.63*** | ***26.86*** | 10.46 | 10.49 |
| Maximum Temperature | ***27.70*** | 13.94 | ***28.32*** | ***22.05*** | 12.55 | ***22.32*** |
| Average Temperature | ***16.41*** | 10.67 | ***11.61*** | ***23.12*** | 11.66 | ***19.24*** |
| Minimum Temperature | ***14.81*** | 7.11 | 6.85 | ***24.52*** | 9.80 | 8.78 |
| Relative  Humidity | ***18.45*** | 13.71 | ***20.45*** | ***32.47*** | 17.27 | ***14.36*** |
| Wind  Speed | 7.01 | 2.99 | 3.47 | - | - | - |
| Minimum Wind Direction | 6.24 | 4.51 | 4.85 | 10.53 | 3.11 | 3.60 |
| Maximum Wind Direction | 1.92 | 2.66 | 1.91 | 8.25 | 2.12 | 6.76 |
| Southern Oscillation Index | 6.36 | 6.30 | 9.18 | ***17.97*** | 5.65 | ***12.57*** |

*Note: Variable values that are bold, italicized and underlined are deemed to be important based on the computed randomness threshold for MF (>10%) and LG (>11%) datasets.*