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# Comparing Model Results for Predicting Temporal Variations of SST and Rainfall Rate

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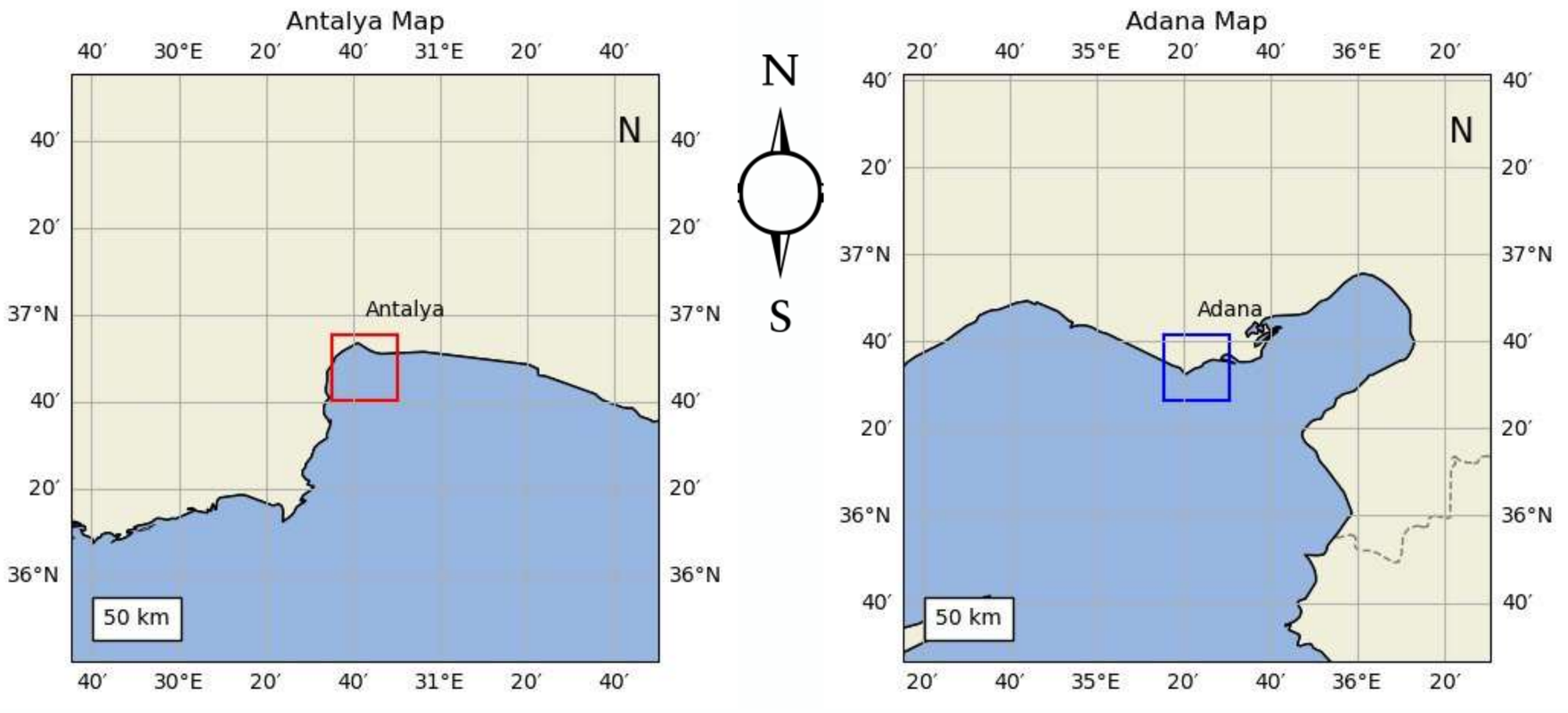
# SST heat affects of the water density

**The warmer the water, the more space it takes up, and the lower its density.**

1) Sea Level Rise
2) Impact on Marine Life
3) Stratification (Lower density stays at surface, lesser exchange with deep water)
4) Ocean Circulation

# Study Area




- Antalya
- Adana

- Th study focused on 2 areas, Eastern and Western part in Türkiye at the Mediterranean sea

# Project Methodology

1. Data Collection

**Coordinates-Dates-Files Conversion**

2. Data Cleaning & Pre-Processing

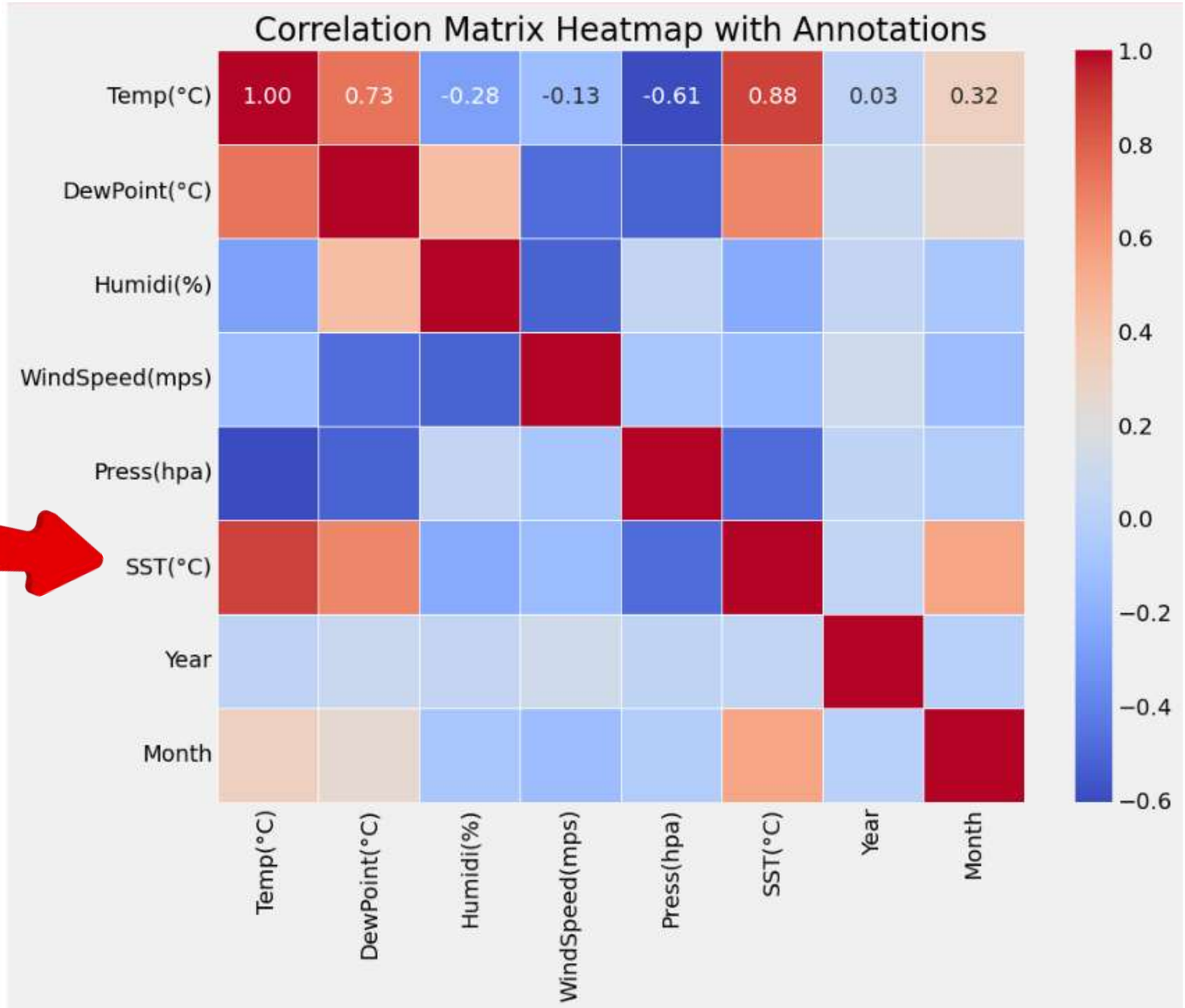
3. Exploratory Data Analysis (EDA)

**Feature Engineering**

4. Model Building

5. Results

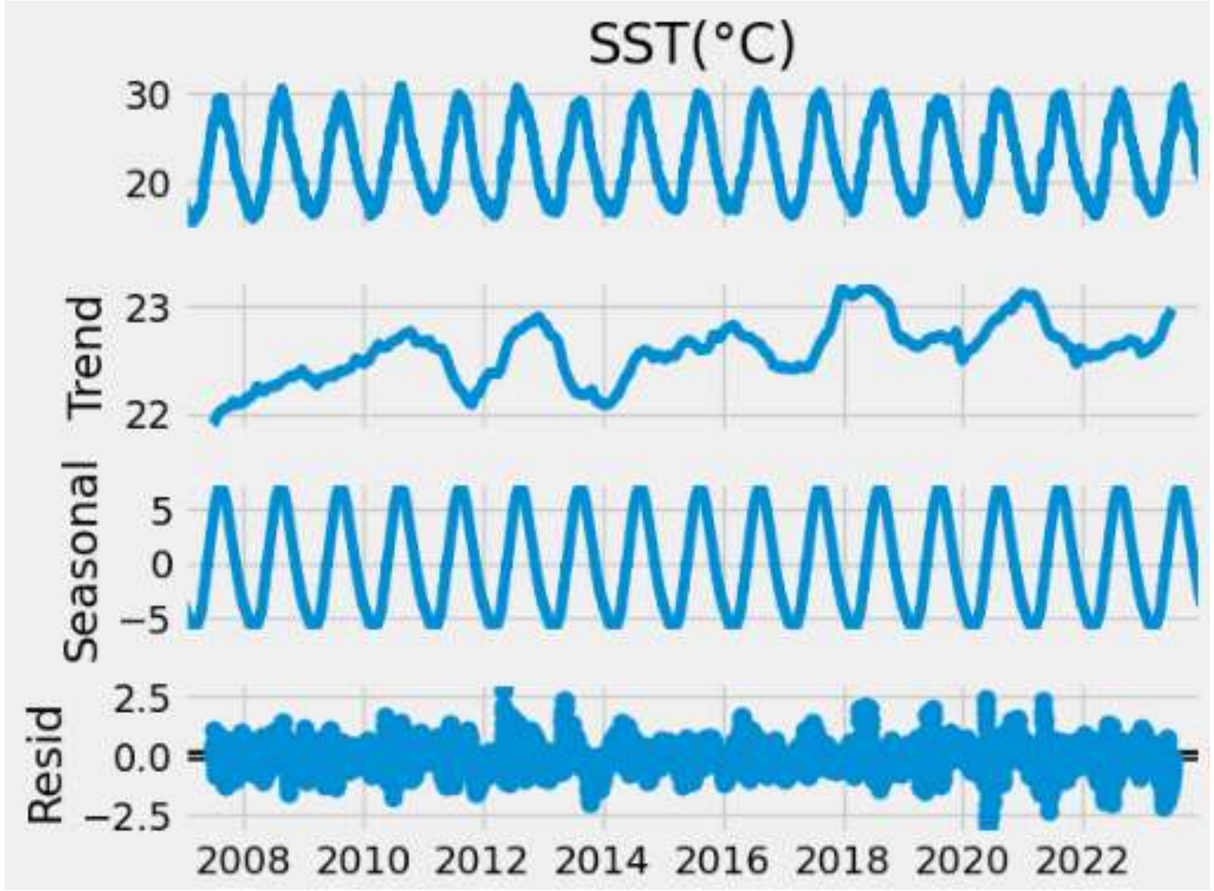
# • Correlation Matrix Heatmap



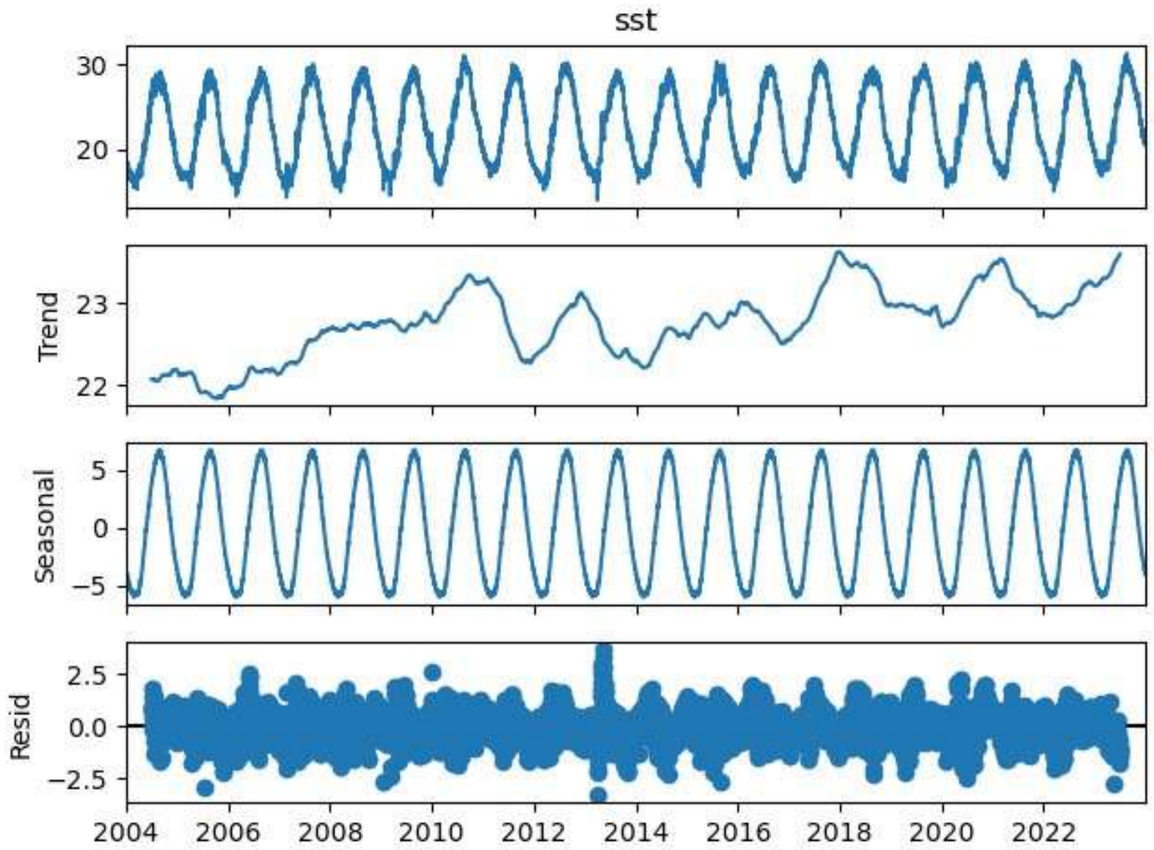

**Strong Cross Relation with Average Air Tempreature and Dew Point.**

# General Analysis – Trends

## SST-Antalya

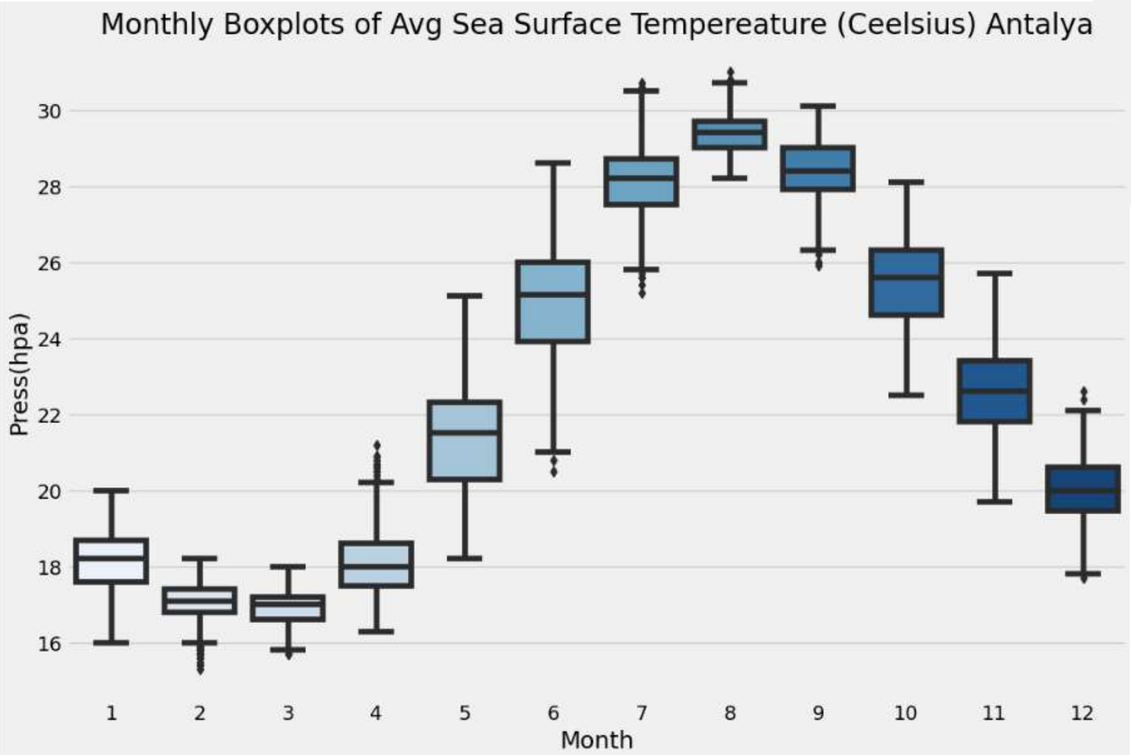


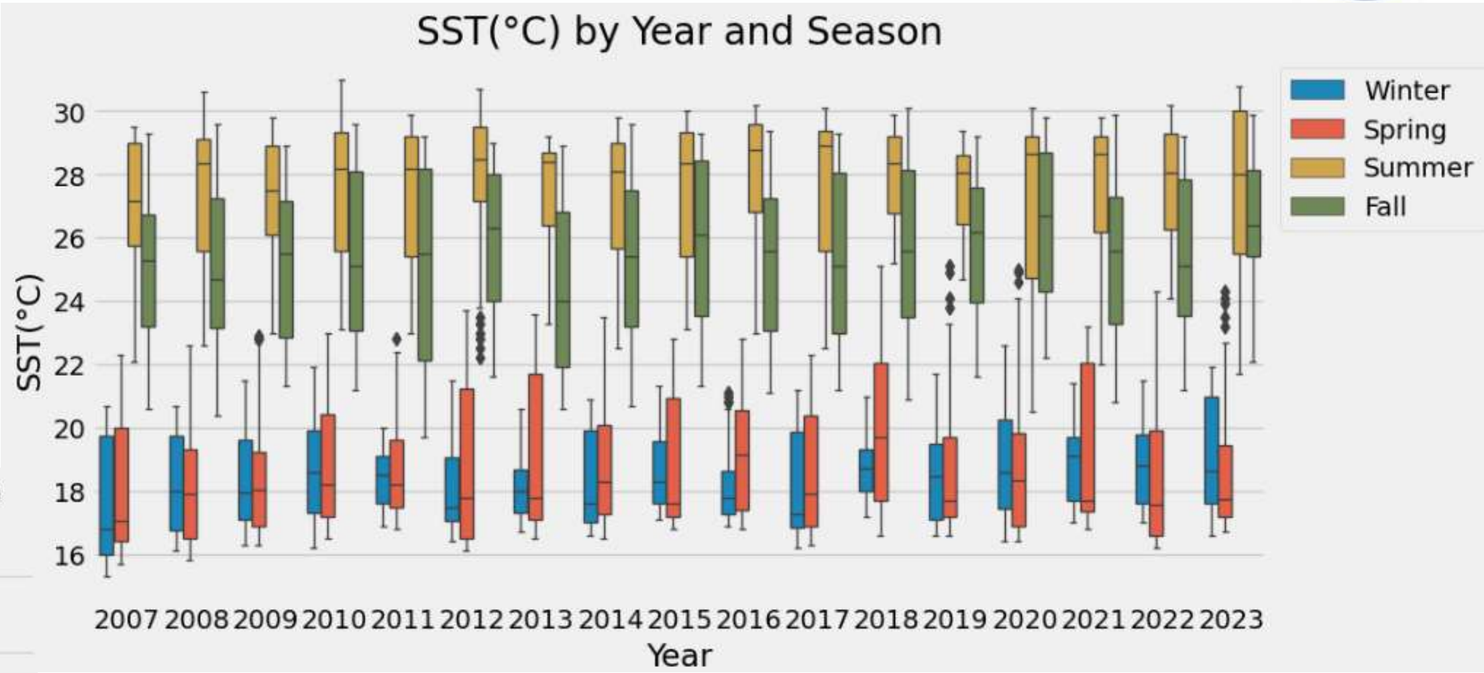

## SST-Adana



# SST for Antalya

- August is the warmest and March is the coldest.

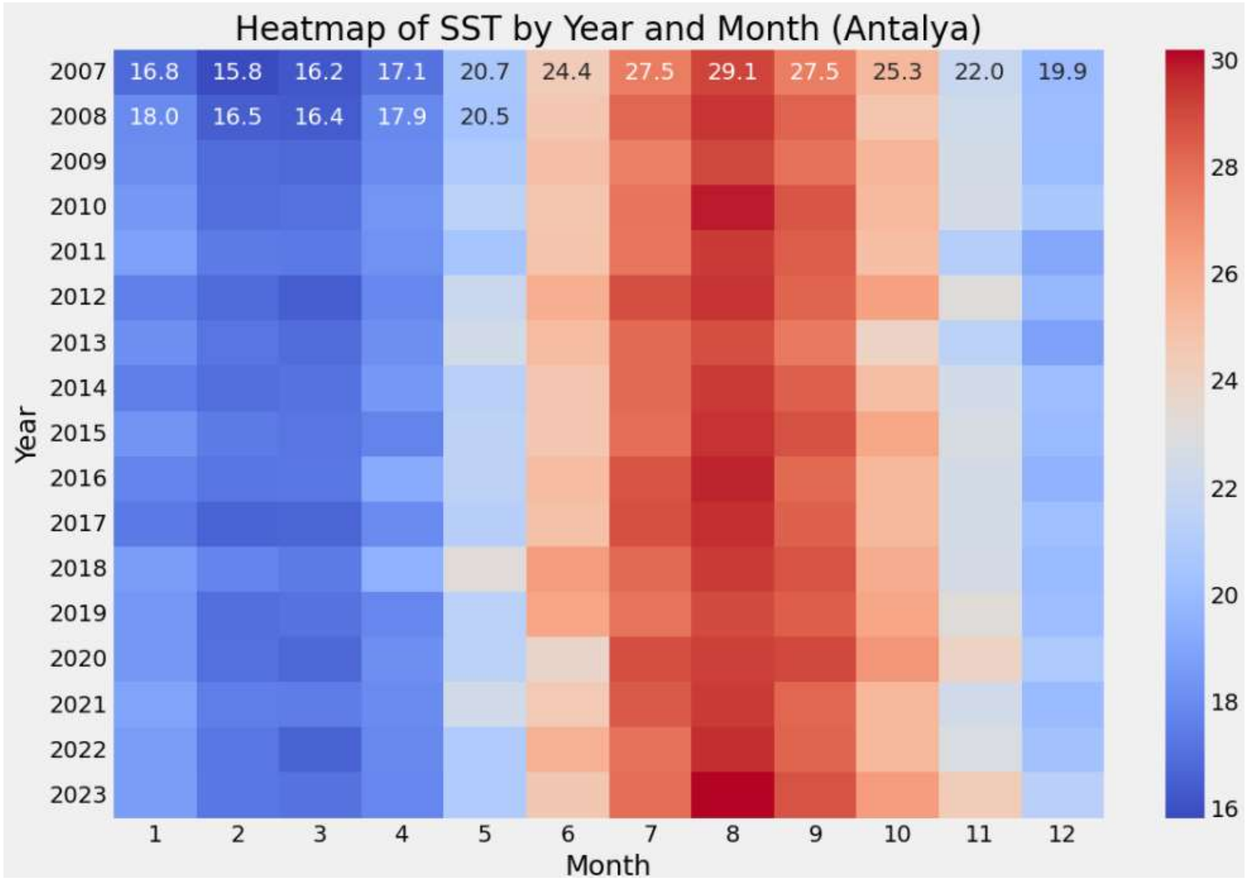


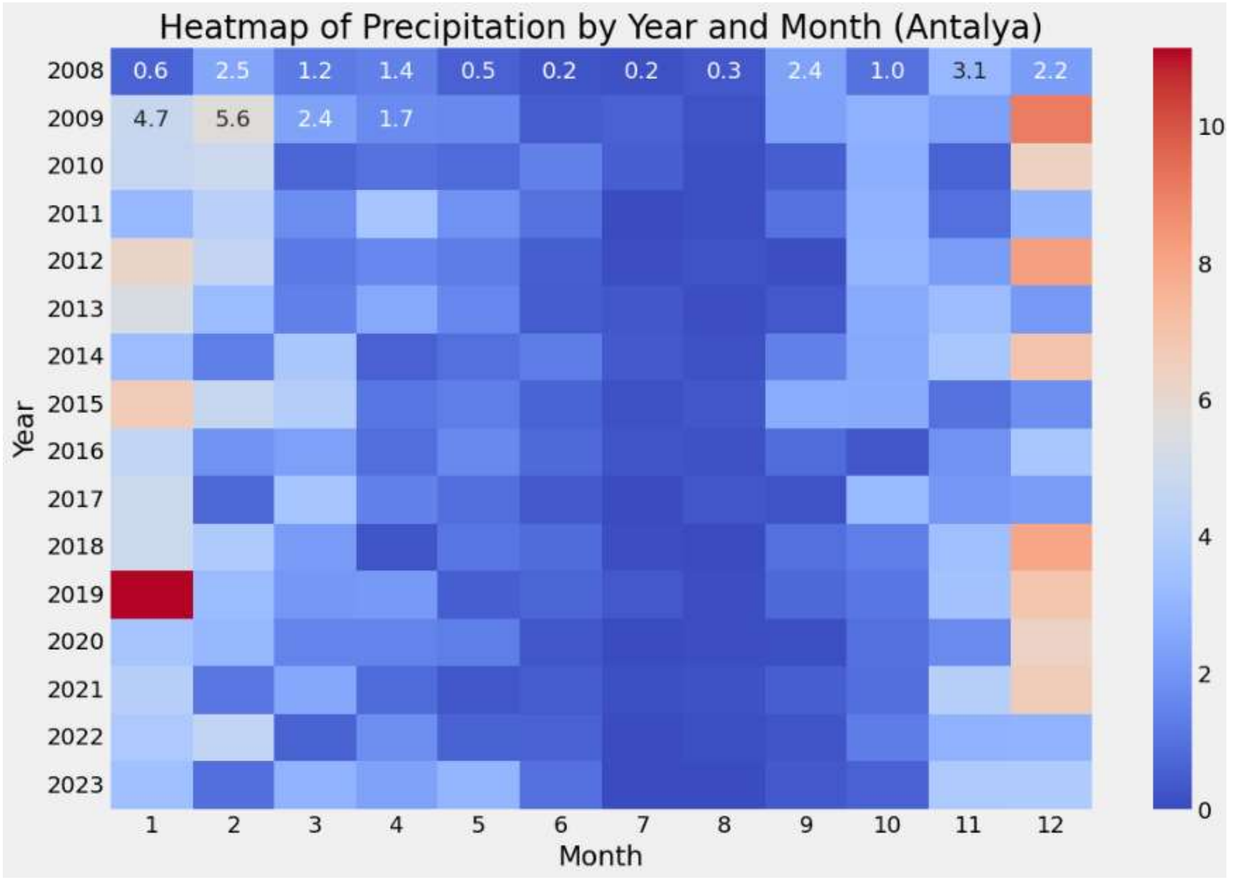

- Importance of understanding un-usual events and linkage between other natural atmospheric activities in the region.

# Specific Analysis

## SST-Antalya




## Precipitation - Antalya



# Machine Learning Models

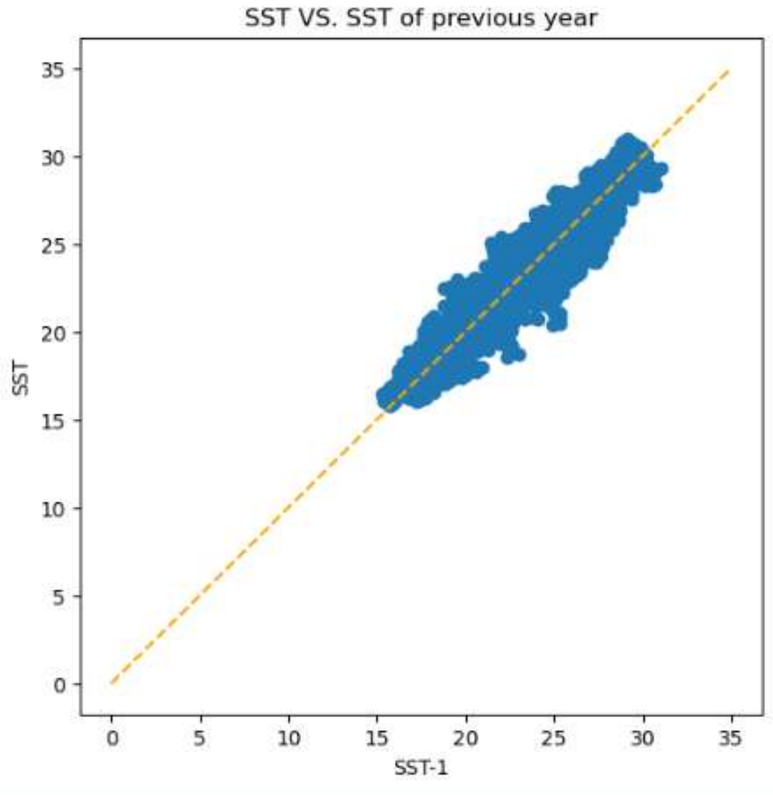
## Antalya

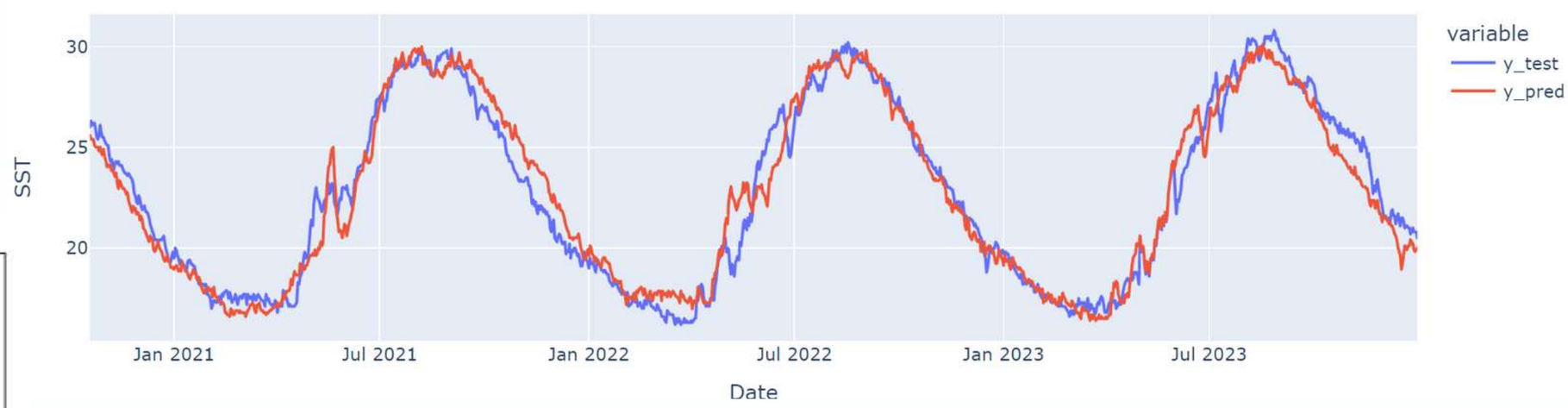
- A) LSTM
- B) Linear Regression
- C) Decision Tree

## Adana

- A) XGBoost
- B) Random-Forest
- C) AdaBoost
- D) SVM

# Linear Regression



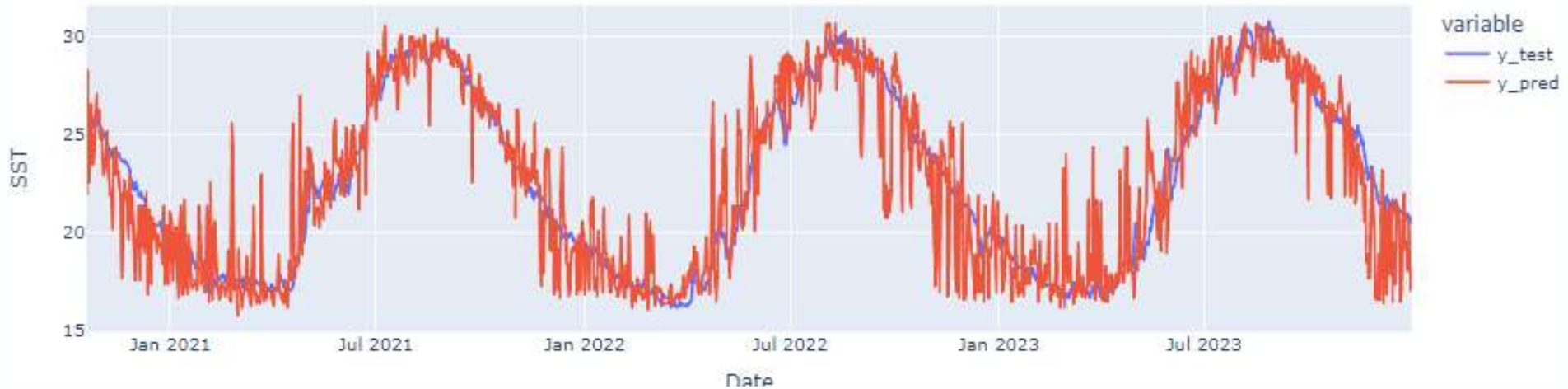




- **The relation between SST and itself after shifting 365 days.**

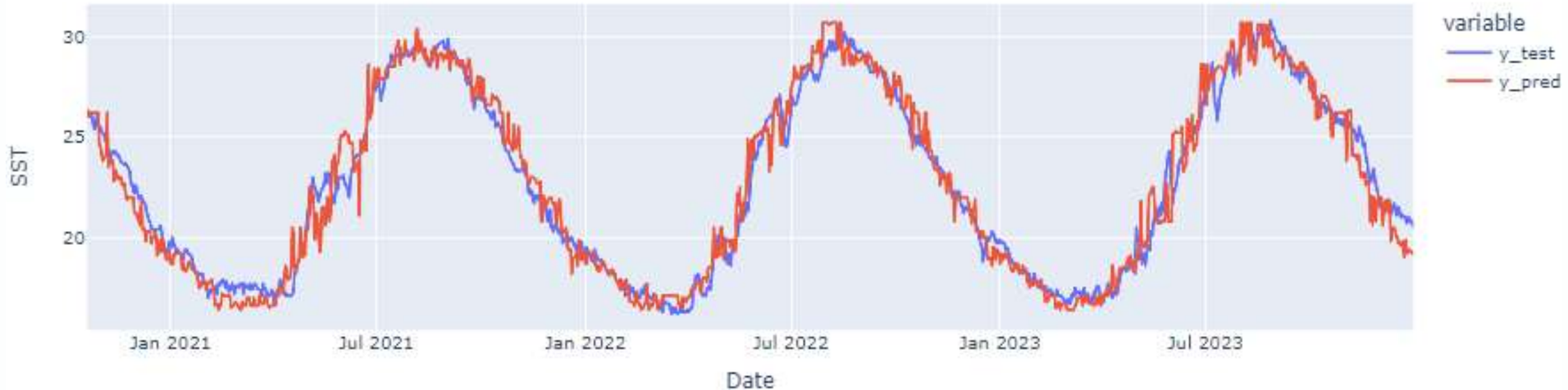
**94.70%**

# Decision Tree - Feature Engineering

## Before:

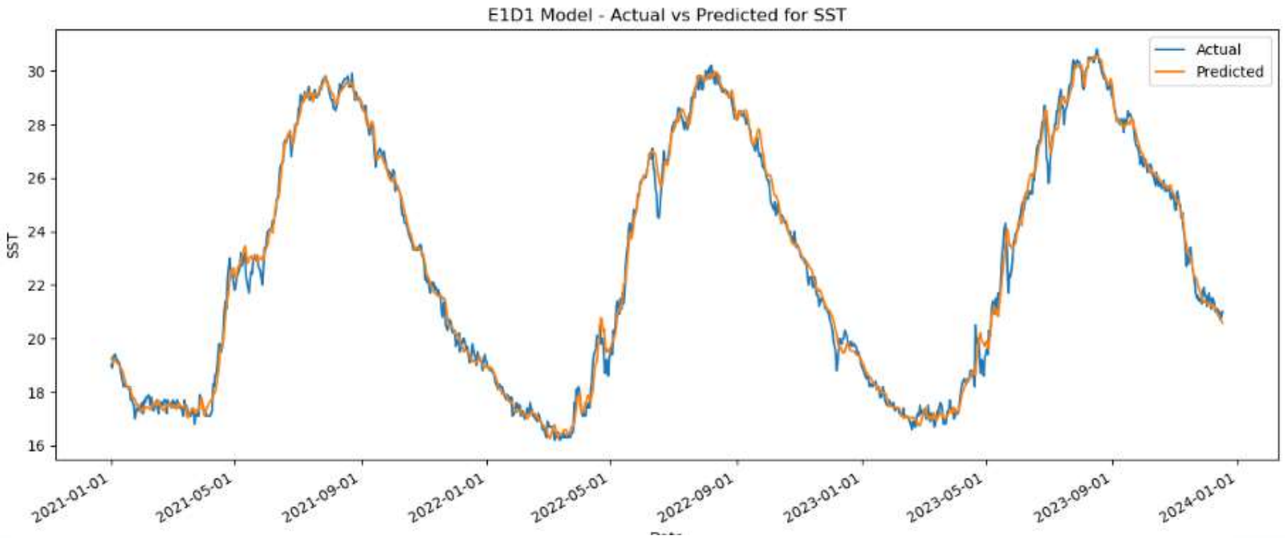



## After:




- Year
- Month
- Day of Year

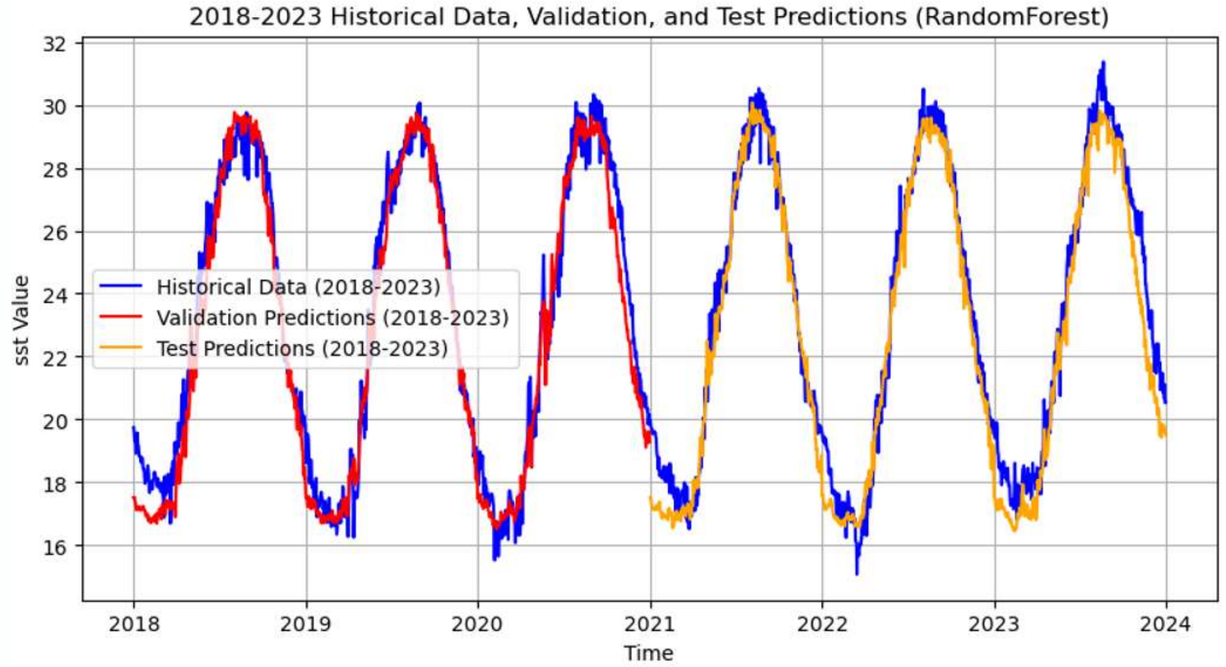
# SST Results




## LSTM

**98.78%**

**E1D1 ==> Sequence to Sequence Model with one encoder layer and one decoder layer.**



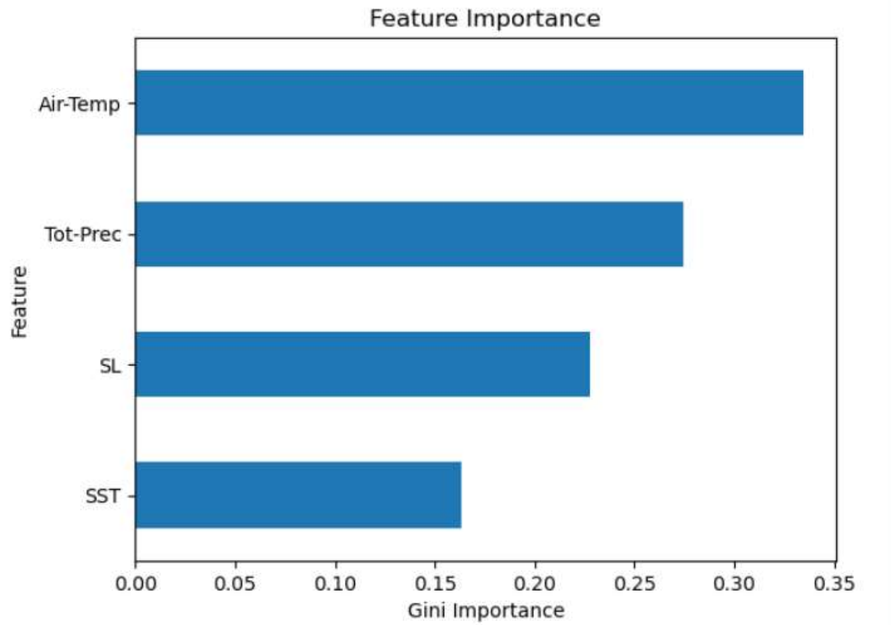

## Random-Forest

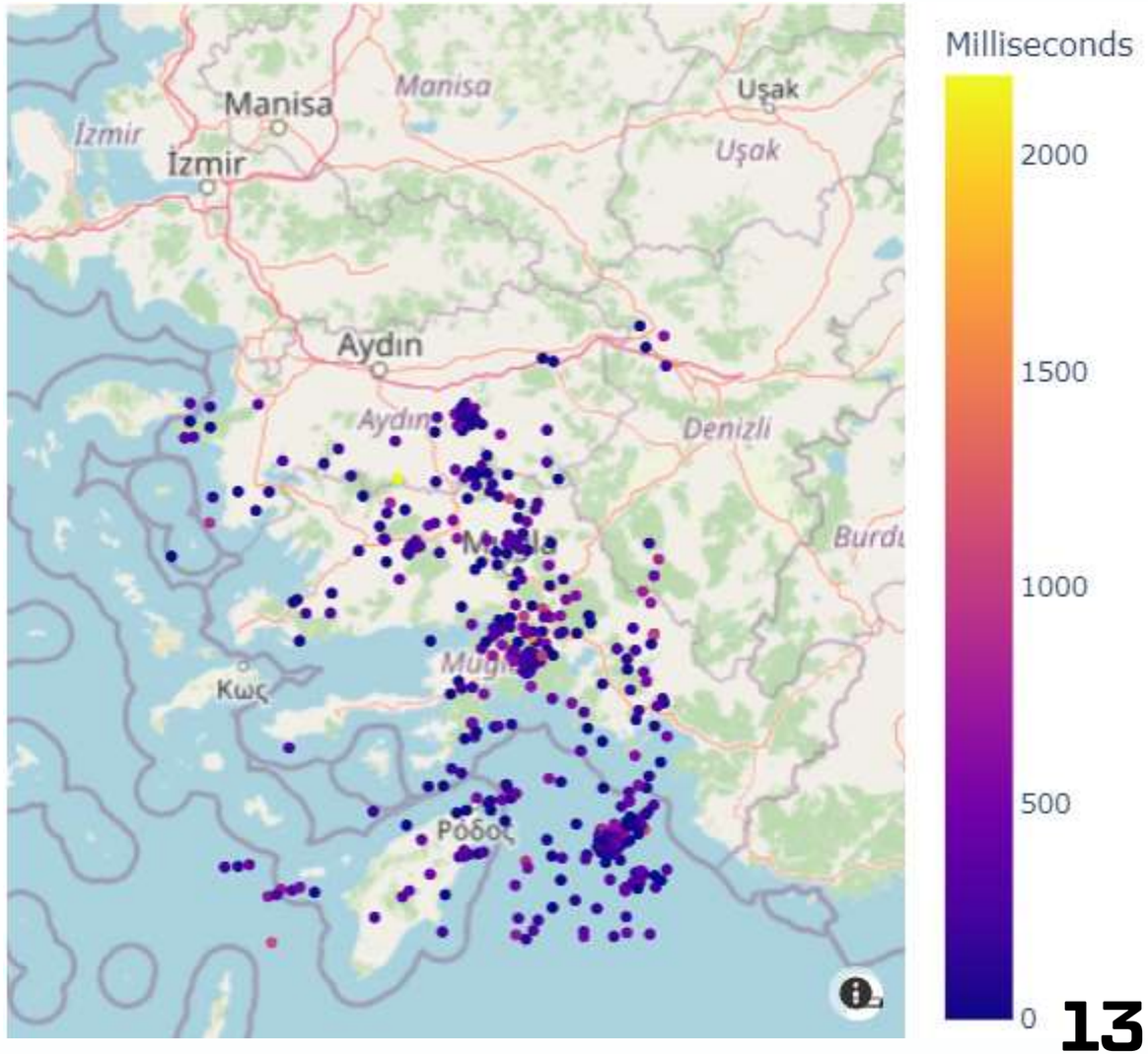
**98.9%**

**Test set 2021 - 2023**

# Future Work – Early Warning System

| | SL | SST | Air-Temp | Tot-Prec | Event |
|---|---|---|---|---|---|
| **SL** | 1.000 | 0.618 | 0.276 | -0.073 | 0.004 |
| **SST** | 0.618 | 1.000 | 0.869 | -0.188 | -0.081 |
| **Air-Temp** | 0.276 | 0.869 | 1.000 | -0.202 | -0.117 |
| **Tot-Prec** | -0.073 | -0.188 | -0.202 | 1.000 | 0.209 |
| **Event** | 0.004 | -0.081 | -0.117 | 0.209 | 1.000 |



# United Nations Strategic Development Goals








## We All Win,
## If we Succeed.

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Thanks for listening!

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