# Impact of weather on daily air traffic

Paphos International Airport, Cyprus

# Introduction

- **Project Objective:** This data science project aims to analyze the impact of weather conditions on daily air traffic at Paphos International Airport of Cyprus.
- **Purpose:** By understanding the interplay between weather patterns and air traffic, we strive to enhance planning, operations, and safety.
- **Airport Significance:** Paphos International Airport serves as a pivotal gateway connecting Cyprus to global air travel networks. And city of Paphos being a one of the popular travel destination around the Mediterranean sea makes it important travel hub.
- **Stakeholder Importance:** The insights derived will benefit airlines, passengers, and decision-makers involved in airport operations.
- **Economic Impact:** The project contributes to the efficient functioning of the airport, thereby fostering economic growth in Cyprus.

# Key Questions

- **Air Traffic Variation:**
  - How does the volume of air traffic at Paphos International Airport fluctuate throughout the year?
- **Wind Speed Influence:**
  - How does wind speed vary at the airport across different months?
  - Does wind speed have a discernible effect on the volume of air traffic at Paphos International Airport?
- **Wind Direction Influence:**
  - How does the wind directions at Paphos International Airport vary throughout the year?
  - Is there a correlation between wind direction and changes in air traffic volume?
- **Temperature Dynamics and Influence:**
  - How does the temperature at Paphos International Airport exhibit seasonal variations?
  - Is there a correlation between temperature fluctuations and air traffic volume?
- **Pressure Impact:**
  - Does average air pressure have any relation to the total air traffic at Paphos International Airport?

# Dataset Descriptions

**Datasource 1:** European Data Portal - Daily Air Traffic at Paphos Airport

**Metadata URL:** https://data.europa.eu/en

**Sample Data URL:**

https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.data.gov.cy%2Fsites%2Fdefault%2Ffiles%2FPAFOS%2520AIRPORT%2520DAILY%2520AIR%2520TRAFFIC%25202019.xlsx&wdOrigin=BROWSELINK

**Data Type:** XLSX

**Data Descriptions:**

In this data source contains daily air traffic data of Paphos International Airport divided by monthly basis. Data includes landing and take-off count of both the international and national flights. This dataset also takes into account the transit flights and helicopters landing and take-off information. For the project I have used the monthly data of the years 2018, 2019, 2020 and 2021.

**Datasource 2:** Meteostat Developers - Daily weather data of Paphos International Airport of Cyprus

**Metadata URL:** https://dev.meteostat.net/bulk/daily.html#endpoints

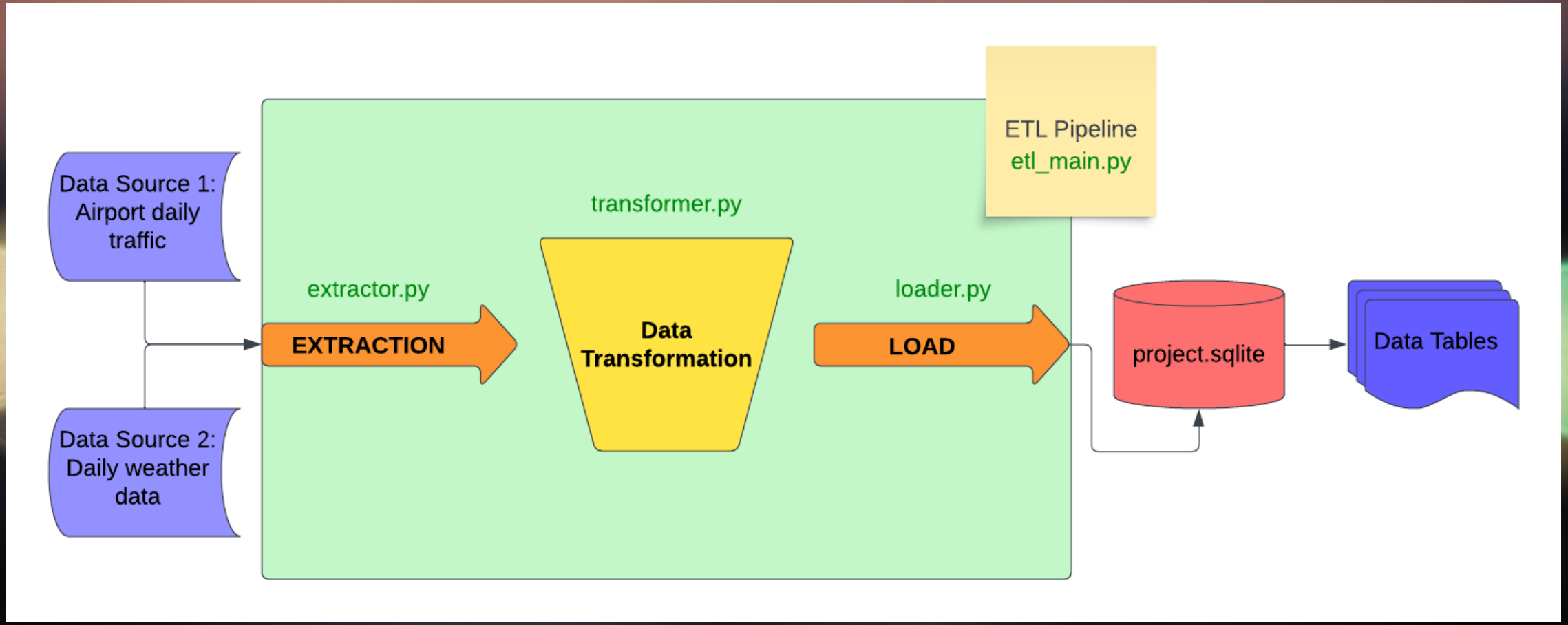
**Sample Data URL:** https://bulk.meteostat.net/v2/daily/%7Bstation%7D.csv.gz ( Station-id of Paphos Airport = '17600')

**Data Type:** CSV

**Data Descriptions:**

This data source will provide daily weather and climate data of Paphos Airport that includes average air temperature, daily minimum and maximum air temperature, monthly precipitation total, maximum snow depth, average wind direction and speed, peak wind gust, average sea-level air pressure, and monthly sunshine total.

# Project Structure

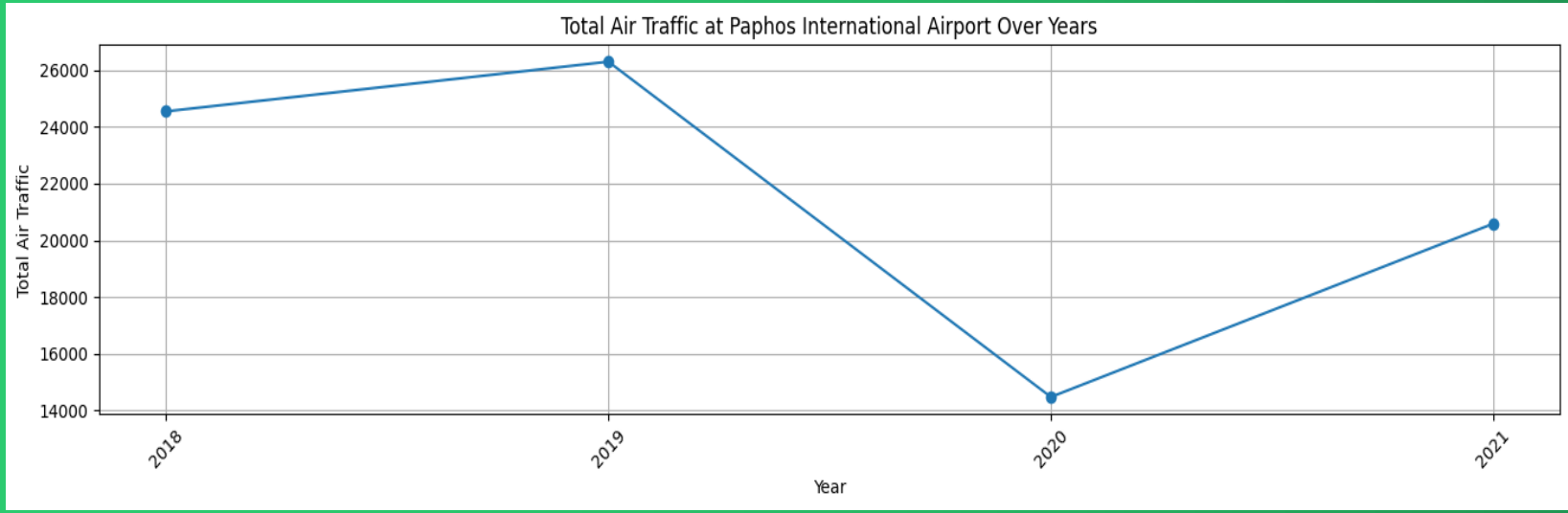


# Result and Analysis

**Air Traffic Variation:**

How does the volume of air traffic at Paphos International Airport fluctuate throughout the year?

Paphos International Airport, the second-largest and bustling gateway in Cyprus, is a vital hub for tourists exploring the picturesque resorts and captivating city of Paphos in western Cyprus.

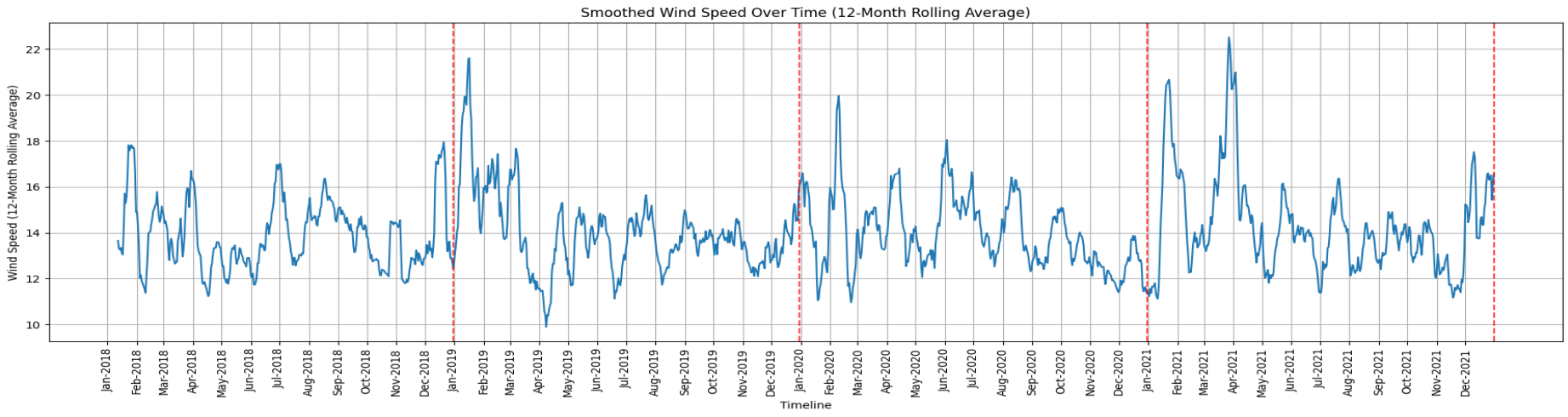



2018: More than 24000 flights
2019: more than 26000 flights
2020: little more than 14000 flights
(Due to COVID restrictions)
2021: more than 20000 flights.

# Result and Analysis

**Wind Speed Influence:**

How does wind speed vary at the airport across different months?

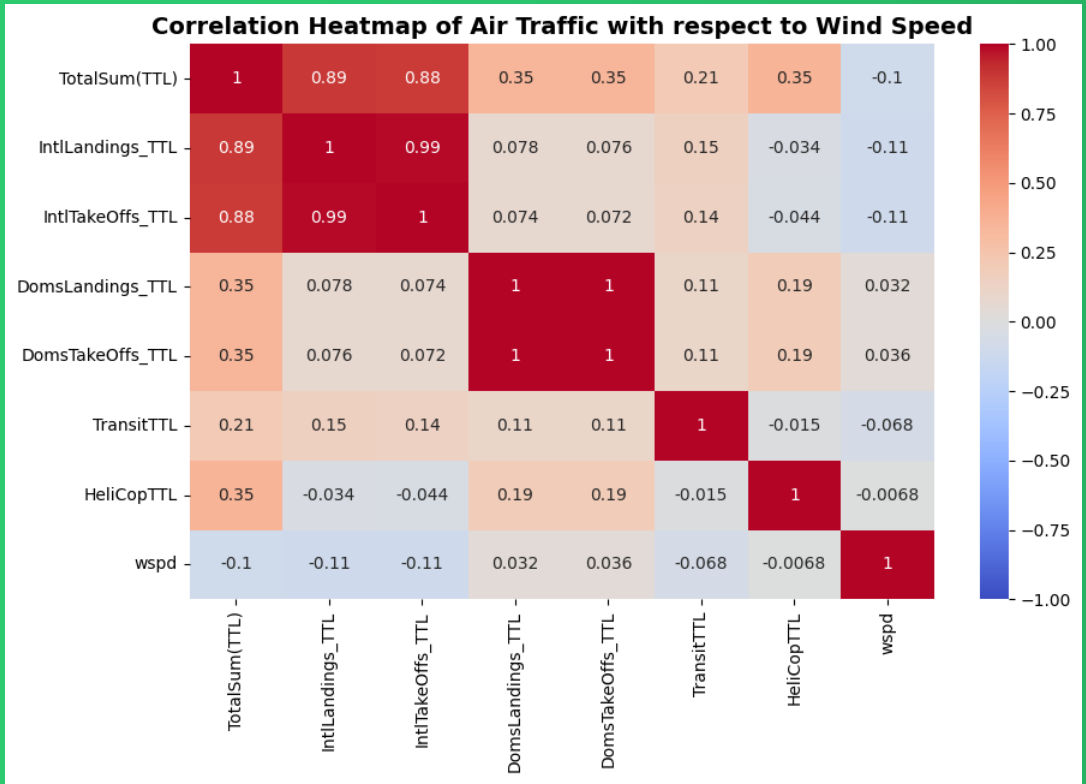



The wind speed graph reveals notable variations throughout the year, with a typical increase in December-February. However, an anomaly in 2020-21 shifted this pattern to higher speeds in January-April, showcasing unique wind dynamics at Paphos International Airport.

# Result and Analysis

**Wind Speed Influence:**

Does wind speed have a discernible effect on the volume of air traffic at Paphos International Airport?



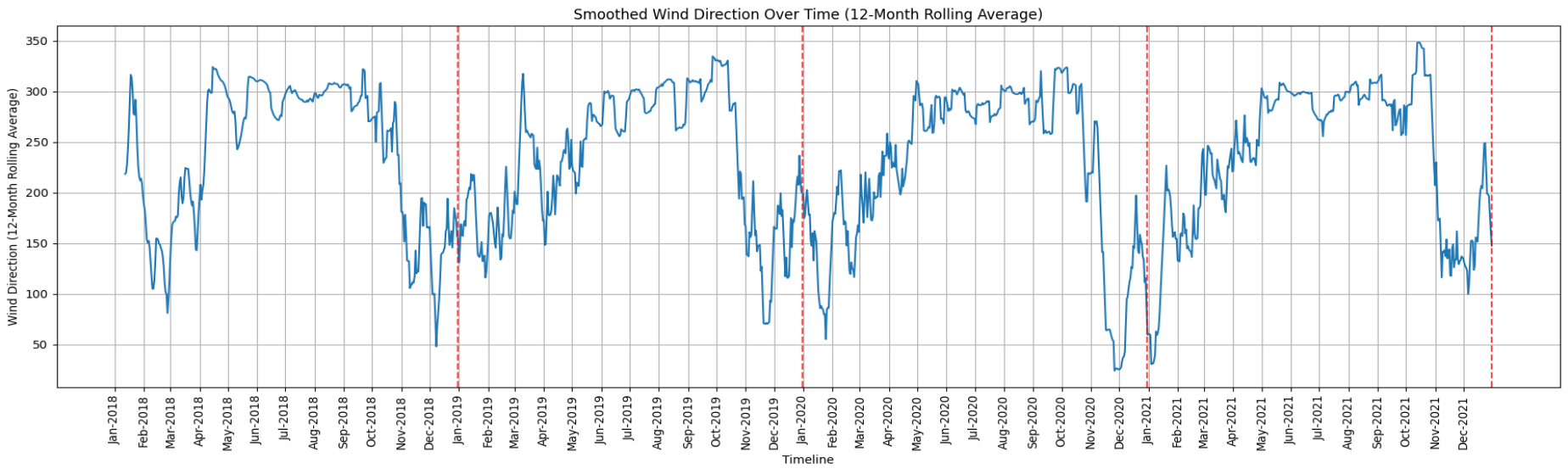

Wind speed exhibits limited correlation with air traffic metrics at Paphos International Airport. There is a weak negative correlation with total air traffic and international operations, while domestic and helicopter activities show minimal associations. Transit operations decrease moderately with higher wind speeds.

In summary, wind speed's impact on air traffic appears to be modest.

# Result and Analysis

**Wind Direction Influence :**

How does the wind directions at Paphos International Airport vary throughout the year?

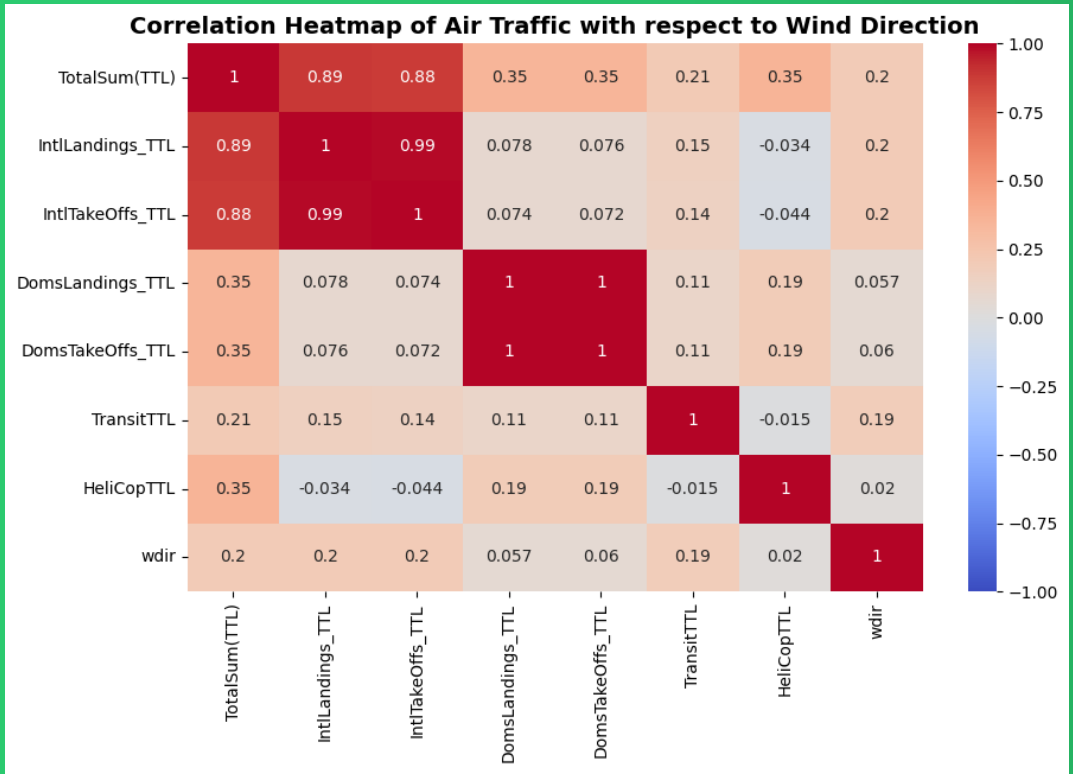



Wind direction at Paphos International Airport displays significant yearly variation with consistent patterns, yet minimal changes are observed month-to-month across different years.

# Result and Analysis

**Wind Direction Influence:**

Is there a correlation between wind direction and changes in air traffic volume?



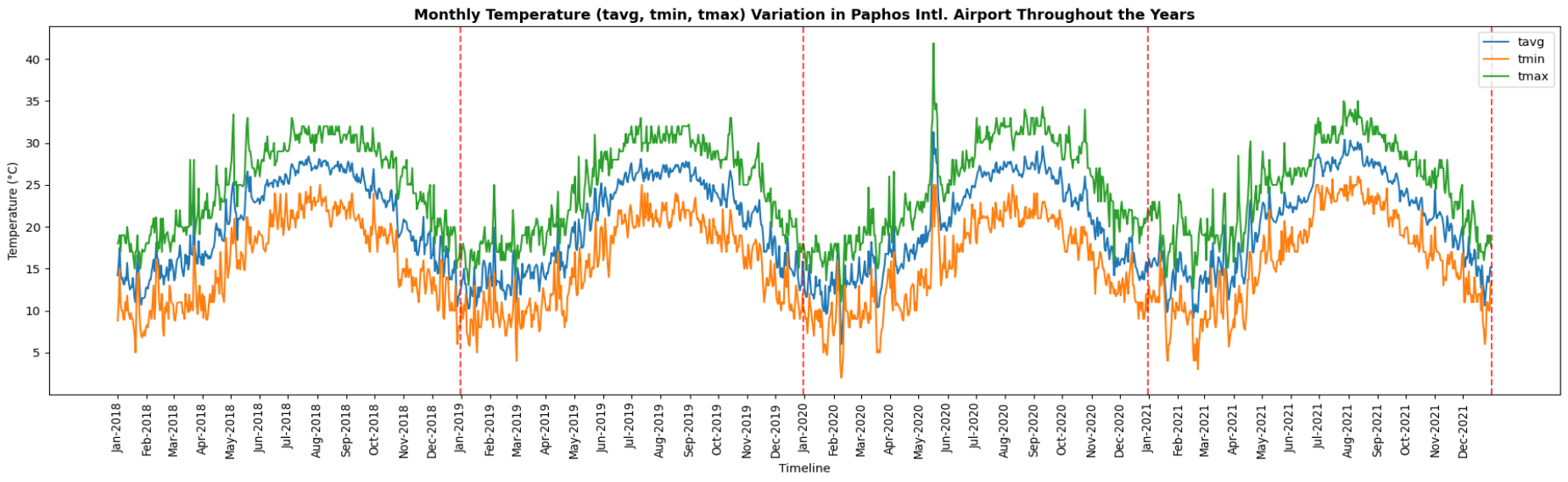

Wind direction at Paphos International Airport demonstrates a moderate positive correlation with total air traffic and international flights, suggesting influence on these patterns. However, weaker correlations with domestic, transit, and helicopter operations indicate varying impacts on different air traffic metrics.

In summary,  moderate positive correlation with various air traffic metrics and wind direction.

# Result and Analysis

**Temperature Dynamics and Influence :**

How does the temperature at Paphos International Airport exhibit seasonal variations?

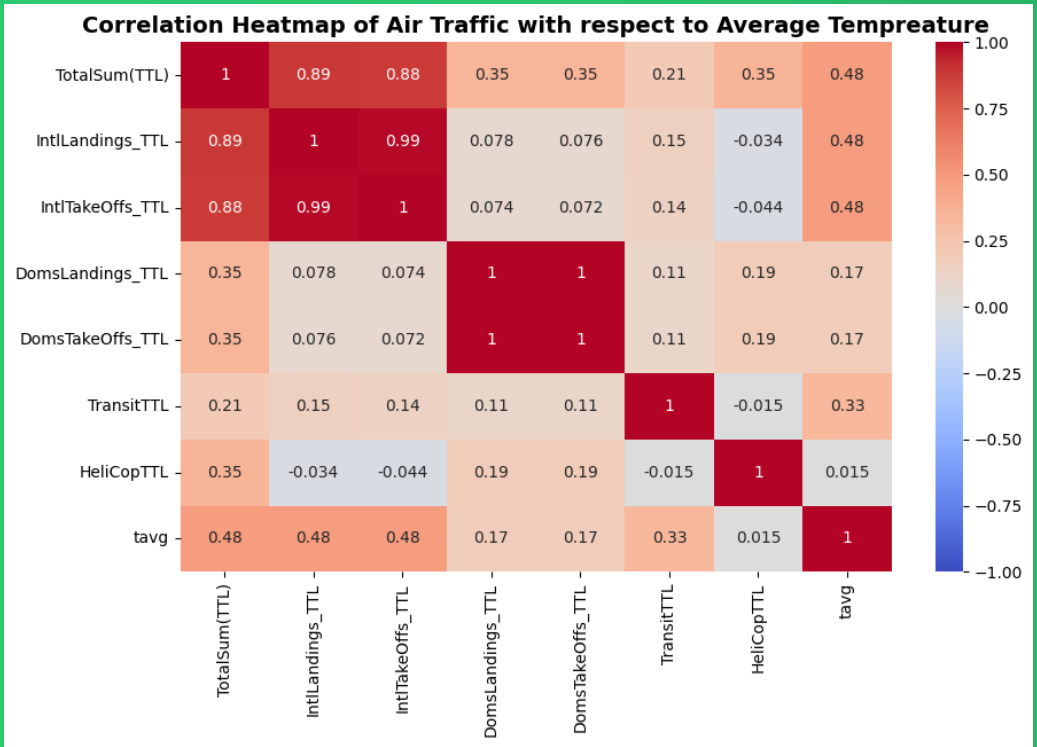



The temperature dynamics at Paphos International Airport present pronounced variations throughout the year, reflecting the region's unique climatic characteristics. The data, encompassing average temperature (tavg), minimum temperature (tmin), and maximum temperature (tmax), reveals discernible seasonal patterns. Typically, Paphos witnesses warmer temperatures during the summer months (May -October), juxtaposed with cooler conditions in the winter (December - February). By scrutinizing these temperature trends spanning multiple years, we can explain the region's climatic shifts, understand its seasonal variation, and determine any evolving patterns that might influence air traffic operations at Paphos International Airport.

# Result and Analysis

**Temperature Dynamics and Influence:**

Is there a correlation between temperature fluctuations and air traffic volume?



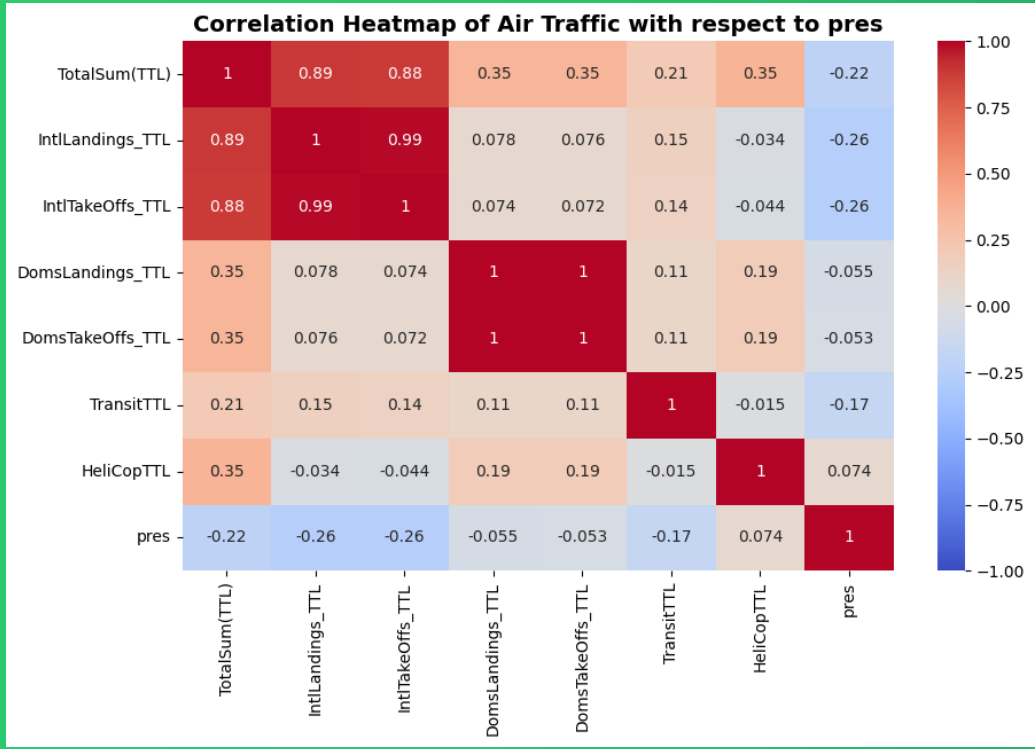

Temperature variations, represented by the average temperature (tavg), significantly influence air traffic at Paphos International Airport. Positive correlations with international landings, take-offs, and total air traffic indicate increased aviation activities during warmer periods, particularly in the summer, aligning with heightened tourist visits. While domestic flights also show a weak positive correlation, the impact is less pronounced. Moreover, transit flights and helicopter operations exhibit varying degrees of correlation with temperature

Thus, in summer season total air traffic increases because of number of tourist increases in the city of Paphos, Cyprus.

# Result and Analysis

**Pressure Impact :**

Does average air pressure have any relation to the total air traffic at Paphos International Airport?




The total air traffic at the airport, mainly driven by international flights, displays a moderate negative correlation with atmospheric pressure, indicating reduced activities as pressure levels increase. Total air traffic, driven primarily by international flights, exhibits a moderate negative correlation (-0.215368) with atmospheric pressure, suggesting reduced airport activities as pressure levels rise. While domestic flights and transit activities also exhibit negative correlations, helicopter operations show a negligible positive correlation with atmospheric pressure, suggesting minimal influence on these specific operations.

Thus, Atmospheric pressure variations significantly influence flight operations at Paphos International Airport, particularly leading to a decline in international and overall air traffic.


Pic Credit: If you want to visit Paphos: https://pipandthecity.com/what-to-do-in-paphos/

# Conclusion

- **Global Events Impact:** Air traffic at Paphos International Airport reflects sensitivity to global events, such as the COVID-19 pandemic, leading to noticeable fluctuations in activity.
- **Weather Influence:** While wind patterns exhibit modest correlations, temperature, especially in the summer, significantly influences flight volumes, highlighting the airport's appeal as a tourist destination.
- **Atmospheric Pressure Dynamics:** Overlooked in non-technical analyses, atmospheric pressure shows a notable negative correlation with flight operations, particularly for international flights, emphasizing its importance in airport planning.
- **Future Work:** Expanding the analysis to detailed season-by-season examinations and incorporating additional data like airline schedules and passenger demographics can offer a more clear understanding. Scenario analysis for long-term climate change implications and adaptive strategies is essential for future airport planning.

THANK YOU!

ধন্যবাদ

DankeSchön