

## **Group 111**

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### **Feasibility Study:**

#### **Introduction:**

This study explores how changing weather patterns impact temperature, rainfall, and wind conditions using data from the **Open-Meteo API**. It aims to understand whether warmer winters and colder summers are linked to changes in rainfall, whether temperature patterns in Europe and North America are opposite (for example, a warm summer in Europe meaning a cool summer in North America), and if increasing wind speeds are connected to extreme rainfall events. By analyzing historical and real-time weather data, this research will help identify trends in climate shifts and their potential effects on different regions.

#### **Research Questions:**

1. How warmer winters and colder summers correlate with rainfall.
2. How are the warm/cold winters/summer in Europe compared to North America, are they opposite of each other (Example warm summer in Europe means cool summer in North America)
3. Is there a correlation between increasing wind speeds and extreme precipitation events over time?

#### **Data Sources:**

<https://open-meteo.com/>

Open Meteo is a free weather API that provides real-time and forecasted weather data worldwide. It offers easy-to-use access to information like temperature, rainfall, wind speed, and more—without needing an account or API key. Open-Meteo is fast, reliable, and ideal for applications in agriculture, logistics, and data analysis. Its simple setup makes it a great choice for businesses and developers looking to integrate weather data into their systems.

To enable us to effectively answer our research questions we decided to build a dataset with the historical weather data for Zürich, Switzerland (47.38°N) and Seattle, Washington

(47.61°N) as both cities have similar latitudes, average summer and winter temperatures and annual precipitation.

### **Potential Risks and Mitigation Strategies:**

#### **1. Data Collection Challenges:**

- *Risk:* Due to the limited API calls (10,000 calls per day), we only get roughly 27 years of daily weather data. It would take us 2 days to complete the 34 years of weather data from 1990 till now.
- *Mitigation:* Collect data on 2 different days for each location or from 2 people and then append the data into one data frame.

#### **2. Data Quality Issues:**

- *Risk:* The API provides historical data from 1940 till the current date. The older data has a lot of missing data.
- *Mitigation:* We decided to stick with more recent timeframes and use historical data from 1990 till 2024.

#### **3. Github Challenges:**

- *Risk:* As we are using the github repository to store our work, there is a risk that we might have a lot of conflicts in our version control.
- *Mitigation:* It should be consistent that every team member should pull the latest version of the notebook/python file first then start to code and commit and push updates regularly.

### **Conclusion:**

This study looks at how weather patterns are changing by analyzing temperature, rainfall, and wind data from the Open-Meteo API. By comparing historical weather data from Zürich and Seattle, we aim to find trends in climate shifts. While there are some challenges, like API limits and missing older data, we have solutions to work around them. With careful data collection and teamwork, this research will help us better understand how weather is changing and what it means for different regions.