

NOVEMBER WEATHER PATTERNS IN LOS ANGELES

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Analyzing November Weather Patterns in Los Angeles from 2015 to 2024

November is the transition point of autumn and winter. Because of global warming, geographical weathers become more abnormal than before. Untypical weathers have appeared worldwide. Los Angeles, the city known for being dry and warm all year long, experienced abnormal weather changes in November 2025. Therefore, this report focuses on the November weather in Los Angeles in the recent 10 years, from 2015 to 2024 (Because the researcher began to work on this project in November 2025, the available data of November 2025 at that time was not enough to analyze, so the project analyzed the November weather up to 2024). By building a historical November baseline and comparing November 2024, this project aims to distinguish statistically significant unusual patterns in the data in a systematic workflow.

Hypothesis: November 2024 in Los Angeles experienced unusually high precipitation compared to typical November conditions in recent years.

Data Collection

Weather data were mainly retrieved from the NOAA Climate Data Online (CDO) Web Services API (v2). The URL is <https://www.ncei.noaa.gov/cdo-web/api/v2/data> . Access to the CDO API requires an API token, which can be applied for free via e-mail sign-ups. The token was requested successfully to scrape the data.

Dataset: Global Historical Climatology Network–Daily (GHCND)

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Station: GHCND:USW00023174 (Los Angeles International Airport, CA, USA)

Time Range: November 2015 to November 2024

Variables: TMAX (daily maximum temperature), TMIN (daily minimum temperature), PRCP (daily precipitation), AWND (average daily wind speed)

331 samples were collected in total. All data were requested in metric units. Because the API has restrictions on the requesting size and time range, data were collected in different parts and then combined together. Additionally, weather data from November to December 2024 were collected for visualizations and relevant statistics.

A secondary data source was tried to gather near-real-time observations using the <https://www.weather.gov>. However, no actual data sets were returned for the chosen location and time range, which was expected. Hence, the analysis relies mainly on the NOAA CDO dataset.

Data Cleaning, Analysis, and Visualization

DATA CLEANING

Raw data were cleaned for the analysis. Units were exchanged if needed in this step. Temperatures were in Celsius, precipitation values were in millimeters, and wind speed values were in meters per second. Missing values were written as nulls.

Additional features were calculated from the collected variables for further analysis: daily average temperature, daily temperature range, 7-day rolling average precipitation, 14-day rolling average precipitation, 7-day rolling average temperature, and 14-day rolling average temperature. These features can be the analyzing basis for both short-term and medium-term weather trend evaluations.

ANALYSIS

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To build a baseline of November weather in Los Angeles from 2015 to 2024, about 300 daily samples were retrieved. Due to Los Angeles' Mediterranean climate, it is common to see a "0" in precipitation. As a result, the baseline distribution is mainly zero-inflated. Descriptive statistics, such as mean and standard deviation, were calculated to summarize the typical November weather traits.

Because the hypothesis is about the abnormality of Los Angeles weather in November 2024, the z -score of precipitation is calculated to evaluate whether a certain sample is considered abnormal. z -score is the quotient of (daily precipitation value – baseline mean precipitation) divided by baseline standard deviation. As the report said, the baseline was zero-inflated, so the baseline mean precipitation and baseline standard deviation are both close to zero: baseline mean precipitation = 0.058 mm, baseline standard deviation = 0.351 mm. If the z -score is greater than or equal to 2.0, the precipitation is considered abnormally high. If the z -score is approximately 0, the precipitation is about the average. If the z -score is lower than 0, the precipitation is drier than the average.

VISUALIZATION

Multiple visualizations were created to support this report: a line chart of daily maximum and minimum temperatures; a line chart of daily precipitation; a line chart of 7-day rolling average precipitation; a box plot of November weather distribution; a line chart of z -scores; and a scatter plot of temperature and wind speed. All visualizations were created using the matplotlib package.

Findings and Conclusions

The data finds that from 2015 to 2024, the November weather in LA has a mean daily precipitation of 0.0578 mm, a standard deviation of 0.3506, a median of 0.0 mm, even the 90th

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percentile is 0.00mm. This shows that in a total of over 300 samples, the majority is considered dry.

For November 2024, the mean daily precipitation is 0.02 mm, with total monthly precipitation of 0.06 mm, showing that November 2024 is drier than the baseline. Plus, no observations have a z-score higher than 2, which indicates that November 2024 did not have unusual precipitation days. The z-score line chart figure also confirmed this conclusion.

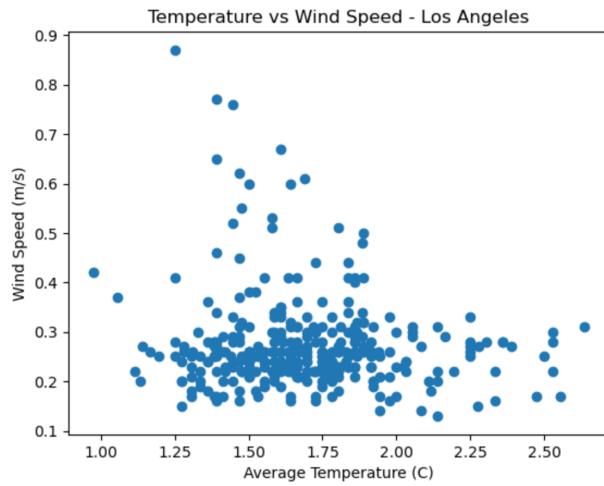


Figure 1: avg. daily temperature vs. wind speed

The scatter plot of average daily temperature and wind speed indicates no linear relationship, which means that wind speed is not a significant role to affect November 2024 precipitation.

All numerical results and visual evidence consistently show that November 2024 in Los Angeles did not experience unusually high precipitation compared to typical November conditions in the recent 10 years, and in fact, November 2024 is drier than the 10-year baseline.

The hypothesis is rejected. In conclusion, November 2024 in Los Angeles did not experience unusually high precipitation compared to typical November conditions in recent years.

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Changes from the Original Proposal

Compared to the original proposal, the final project was expanded to make the analysis more meaningful and deeper connected to course goals and materials. Rather than analyzing a vague short-term period, the project now clearly examines historical November weather data from 2015 to 2024, providing a larger sample size.

The data source was also changed from scraping a single website to using the NOAA Climate Data Online API. Now the website can give a more comprehensive historical record, which leads the project to move beyond basic statistics.

Future Work

Since the research only focused on Los Angeles area, future researchers can consider expanding the geographical region to a broader scope. Additionally, since the data ranged from 2015 to 2024, the record of 2025 was not included, but in November 2025, Los Angeles experienced a week of consecutive raining days, which has a high probability to be considered unusual with statistical significance.