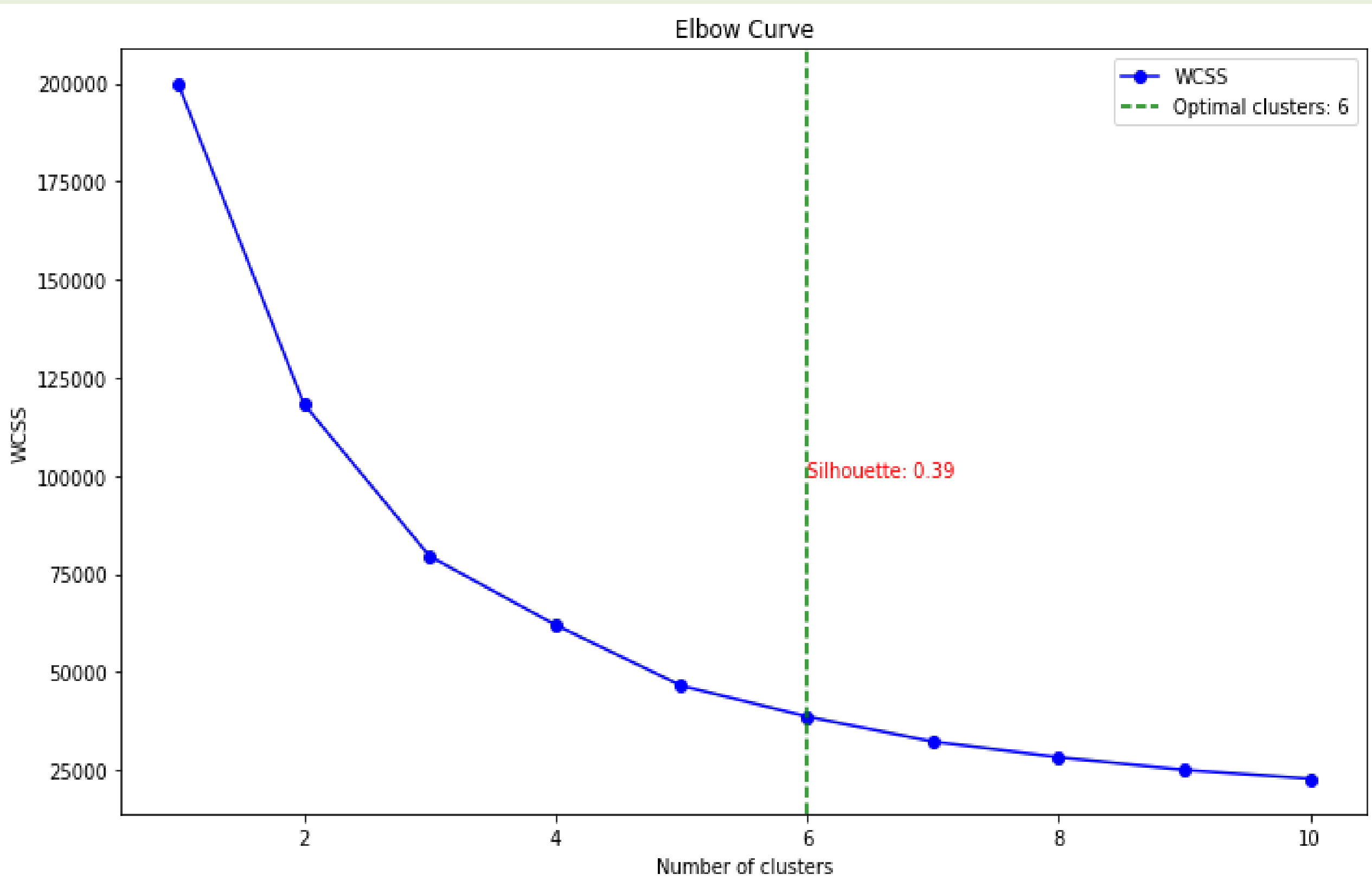


CLIMATIC PATTERN DICHOTOMY

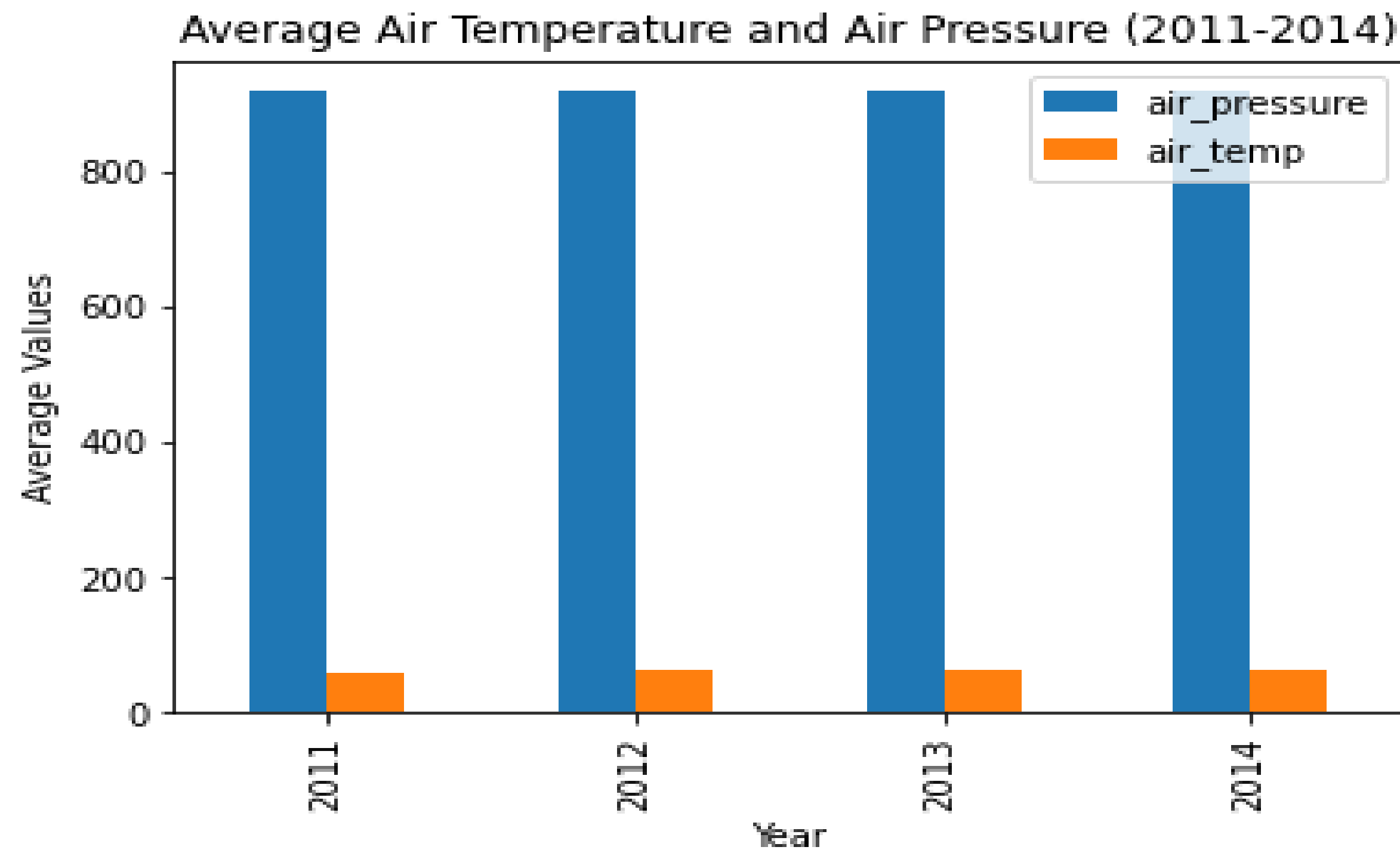


Introduction:

Exploring the nexus of air pressure and temperature, our data analysis unveils the subtle climatic interplays that shape weather patterns. By harnessing clustering and regression models, we illuminate the predictability and anomalies within atmospheric trends.

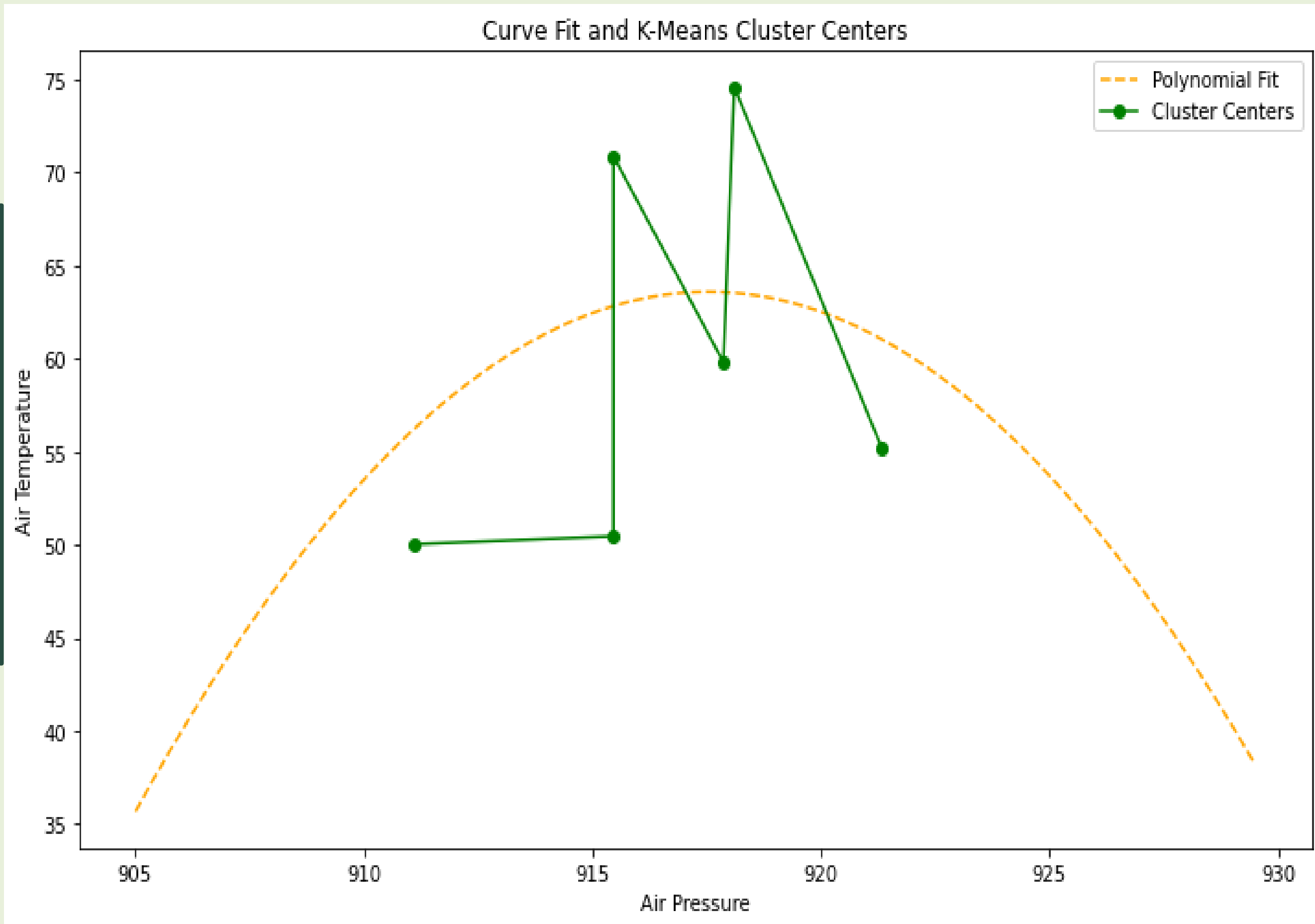
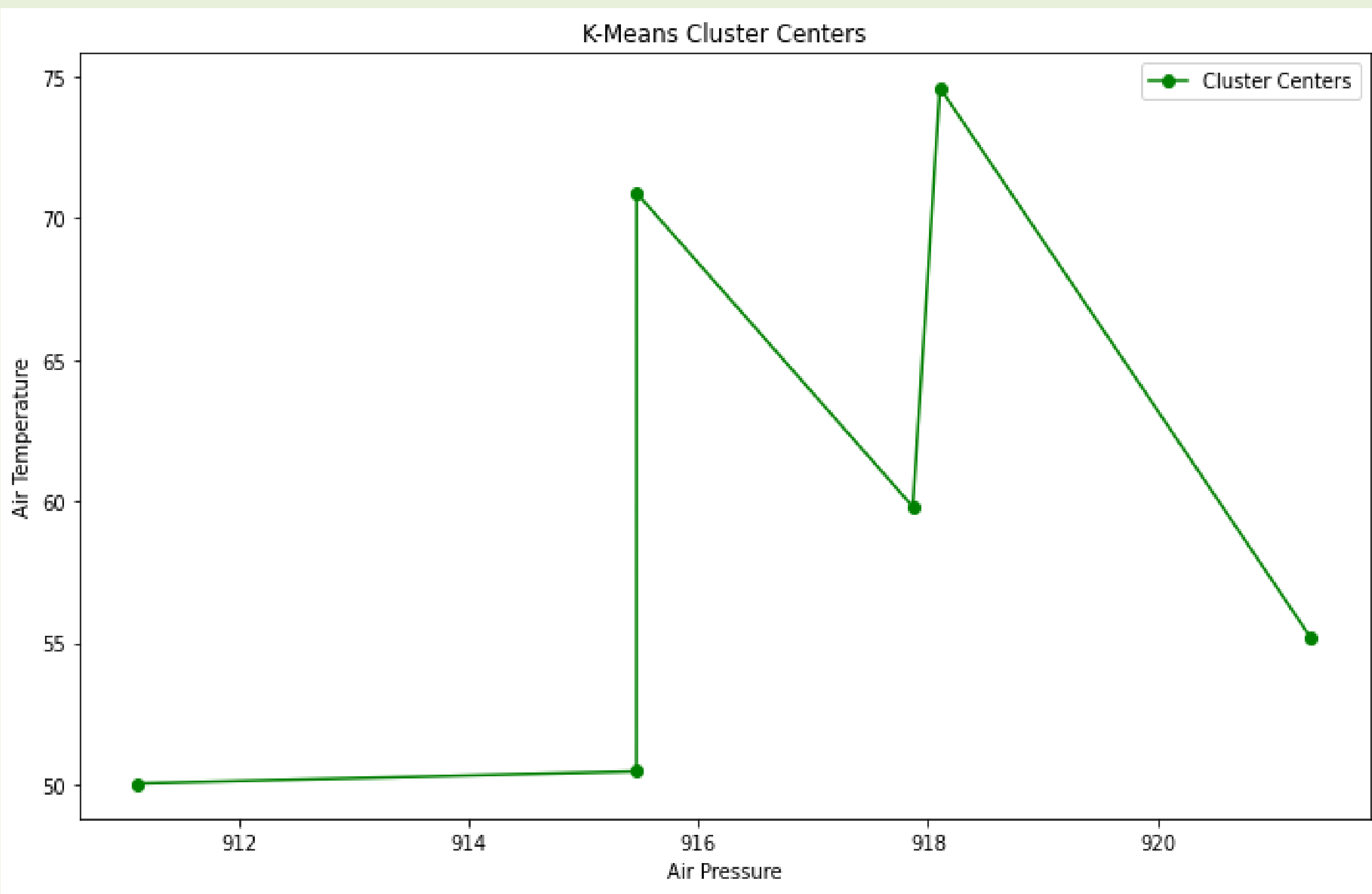
Abstract:

This study employs a data-centric approach to dissect the relationship between air temperature and pressure, revealing distinct clusters and predictive models. Our findings articulate the climatic intricacies and provide a quantifiable forecast framework, offering valuable insights into the temporal stability and variability of weather phenomena.



Clusters: High Pressure vs. Low Pressure:

Comparing clusters reveals a dichotomy: high pressure is associated with cooler temperatures, akin to stable weather systems, while lower pressure aligns with warmer, more dynamic weather. This contrast is a microcosm of broader atmospheric behaviours. The spatial arrangement of cluster centers on the plot underscores the sensitivity of temperature to small changes in air pressure, hinting at the existence of unique microclimates.



Annual Trends: Stability and Shifts

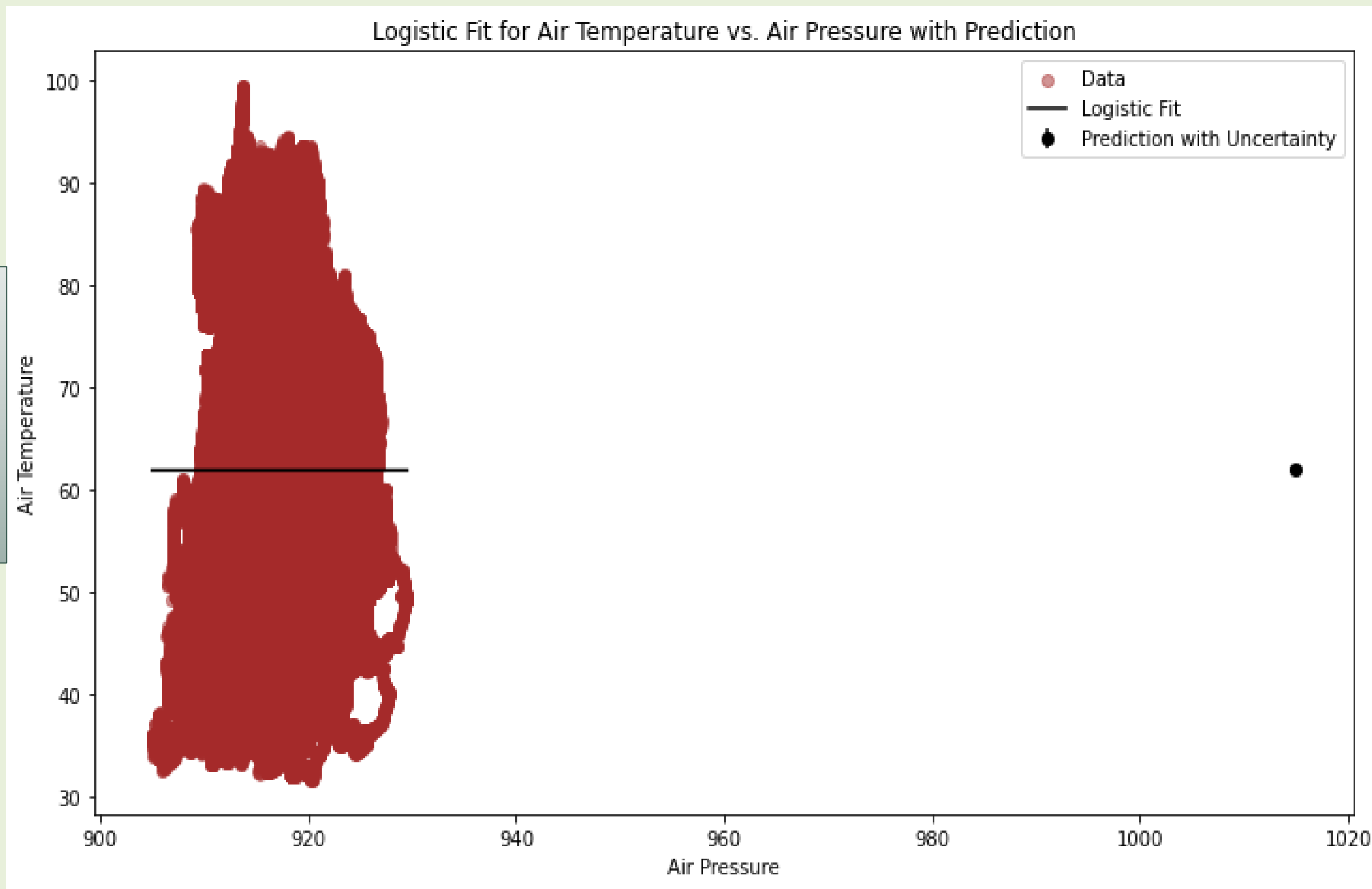
:Yearly data comparisons highlight stable air pressure over time, against the backdrop of fluctuating temperatures. Notable shifts, such as a year with an unexpected temperature dip, prompt investigations into external climatic influences.

Predictive Precision:

The logistic model's predictions, set against actual data, underline its utility. The visualization also includes a point marked as "Prediction with Uncertainty," suggesting that for a given air pressure perhaps around 1015, the model predicts a certain air temperature with an associated confidence interval. The inclusion of error margins in predictions offers a reality check on the model's reliability, essential for real-world applications.

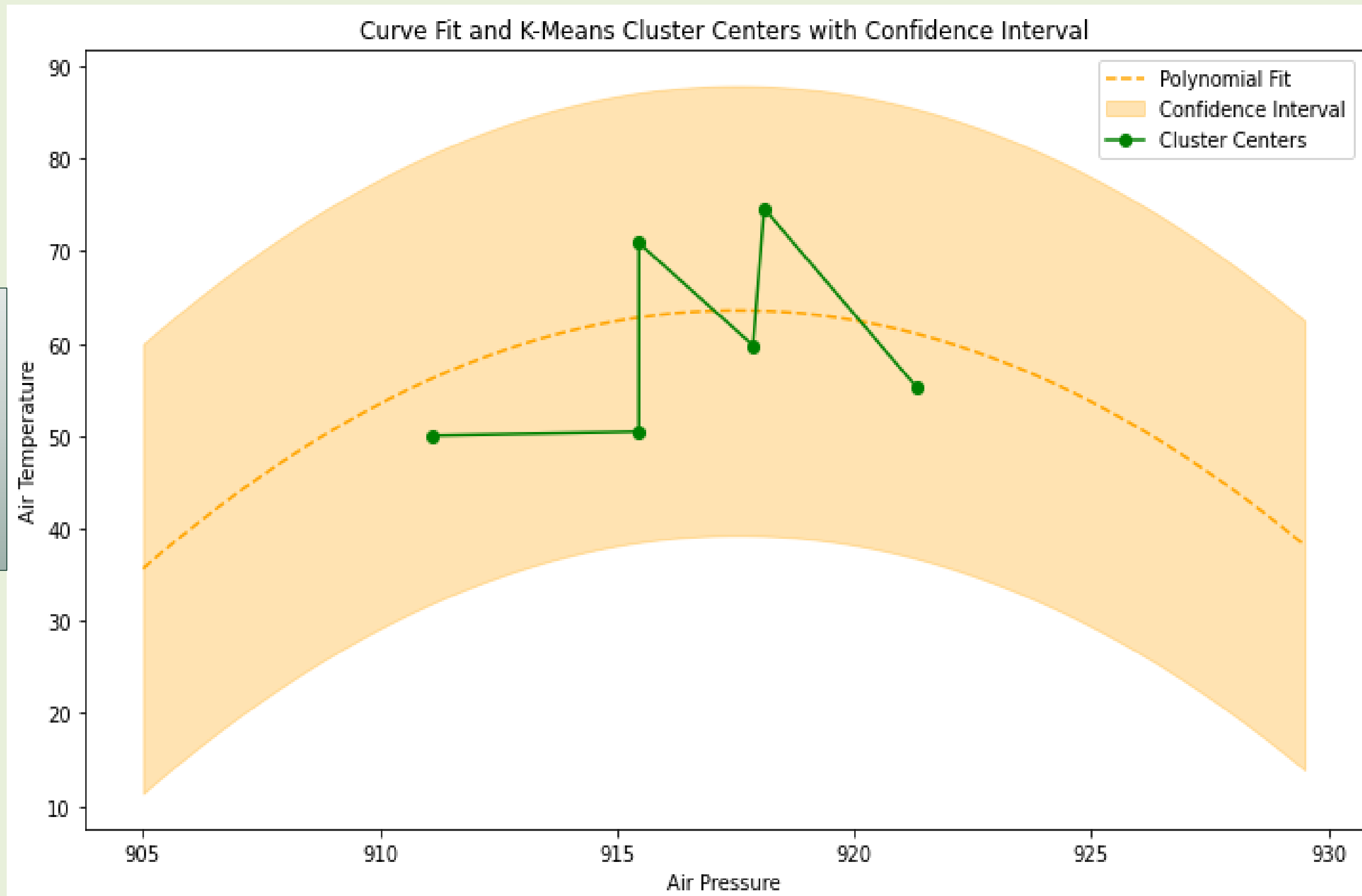
Model Contrasts: Polynomial vs. Logistic:

A side-by-side assessment of polynomial and logistic fits showcases their differing strengths. The polynomial captures broad trends, while the logistic model offers a refined fit, crucial for understanding complex climatic transitions.



Confidence Intervals: Uncertainty at Extremes:

The widening confidence intervals at the extremes in air pressure underscore the model's varying certainty levels, flagging the need for caution in extreme weather forecasting.



Essence of Comparative Climatology:

This condensed narrative presents a stark comparison of climatic patterns, emphasizing the significance of analyzing atmospheric data through various lenses to understand the complex fabric of our climate system.

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Github Link: <https://github.com/Revathi343664/ADS1-ASSIGNMENT-3>