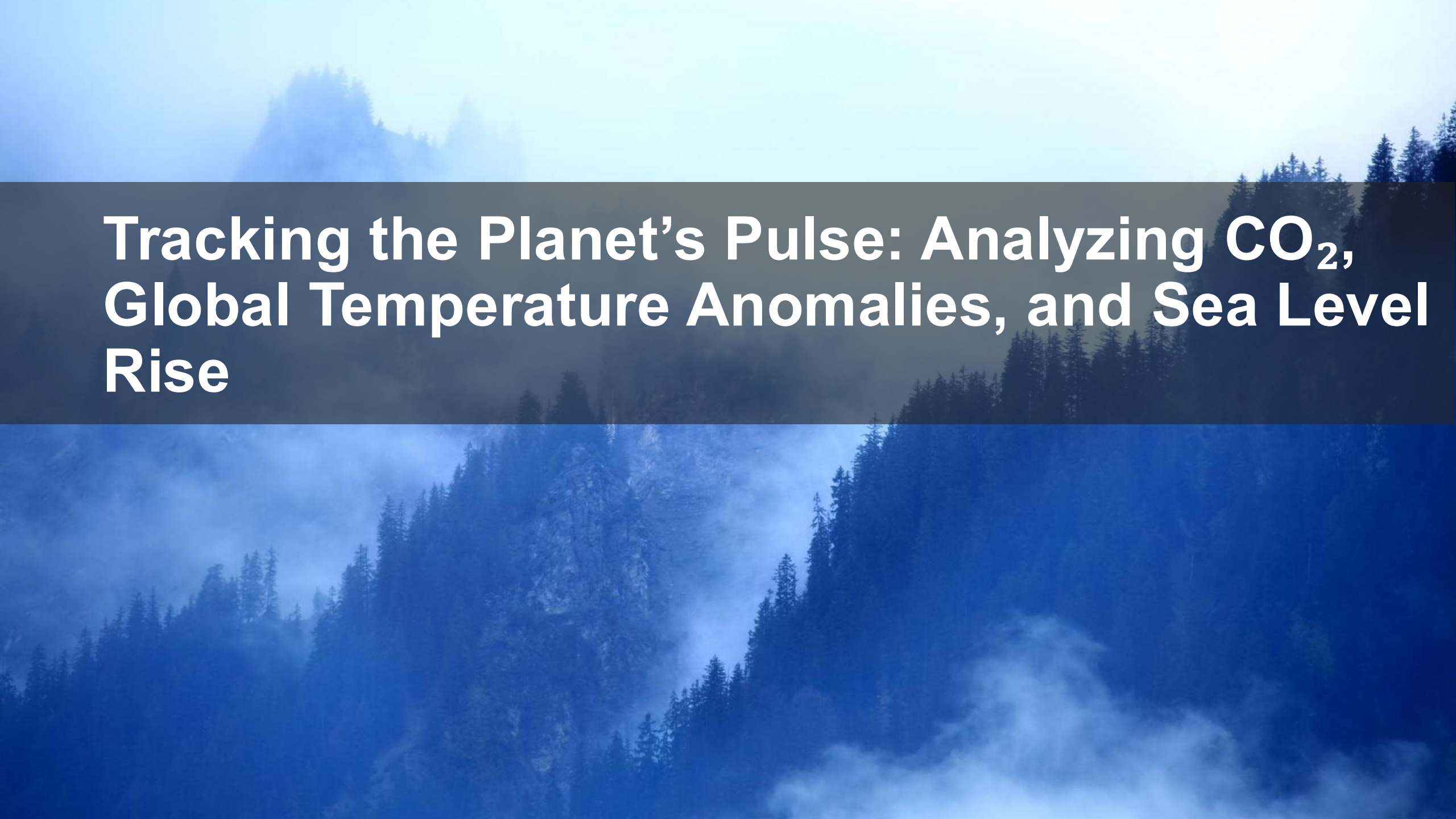

Tracking the Planet's Pulse: Analyzing CO_2, Global Temperature Anomalies, and Sea Level Rise

Tracking the Planet's Pulse

Analyzing CO_2, Global Temperature Anomalies, and Sea Level Rise

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Introduction and Hypothesis

- Context: Climate change urgency
- Key Indicators: CO_2, global temperature anomalies, sea level rise
- Hypothesis: As CO_2 increases, we expect to see a corresponding increase in temperature anomalies and sea level

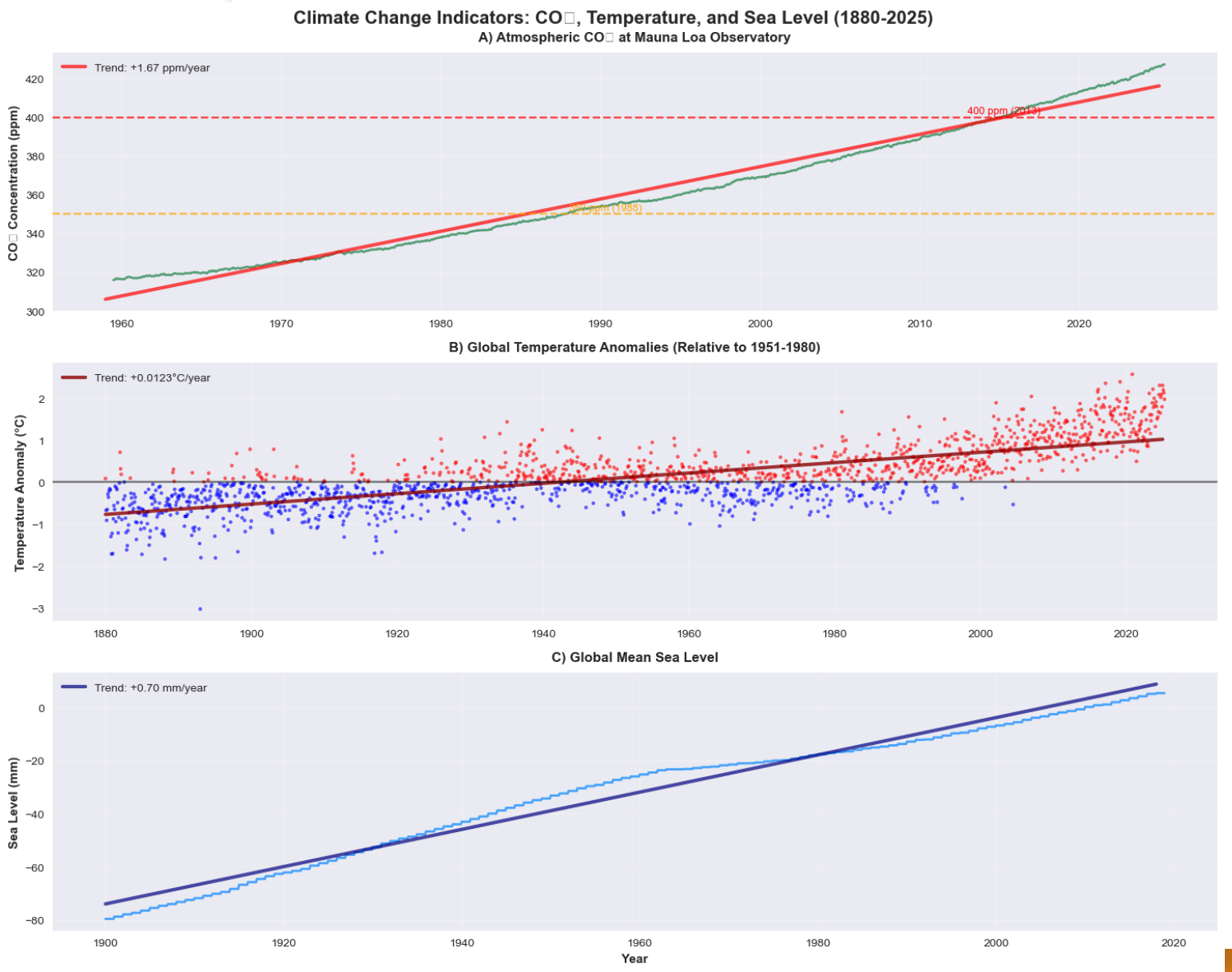
Data Sources and Methods

NASA/NOAA datasets (CO_2, temperature anomalies, sea level)

Monthly time-series (1900 – 2025)

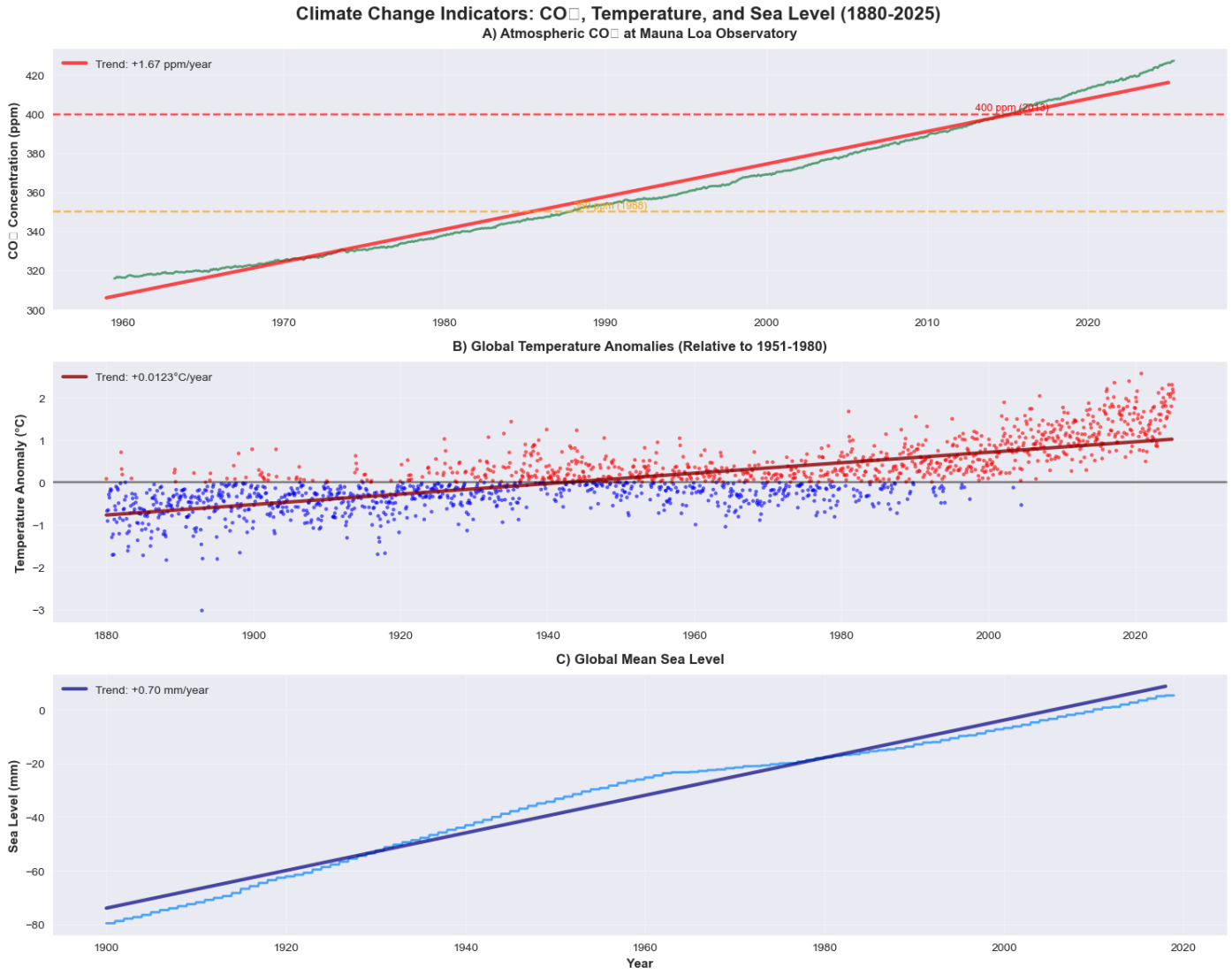
Methods: parsing, merging, rolling averages, regression, and visualization

Long-Term Trends

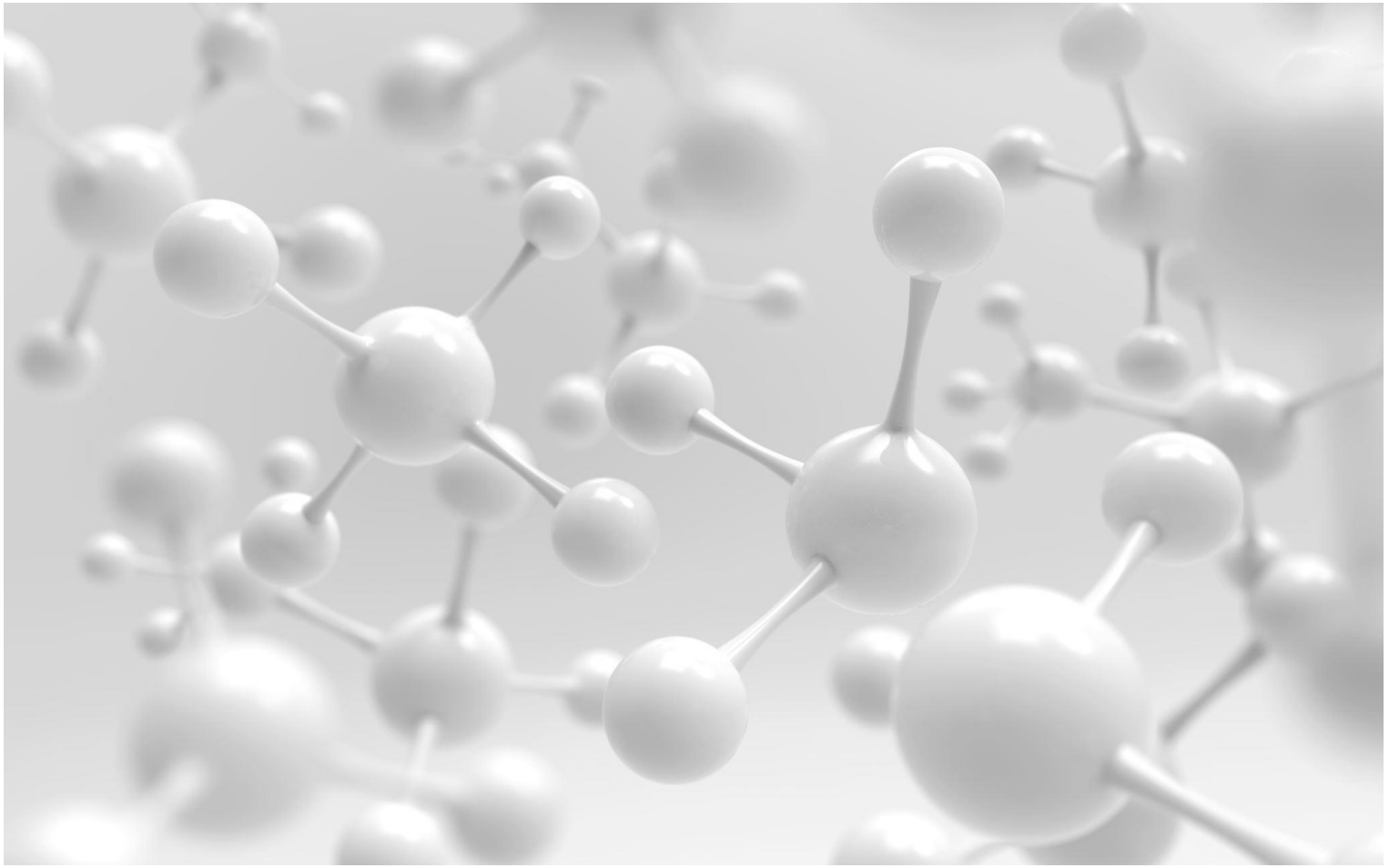


Long-Term Trends (cont.)

- CO_2: +1.67 ppm/year
- Temperature: +0.0123°C/year
- Sea level: +0.70mm/year

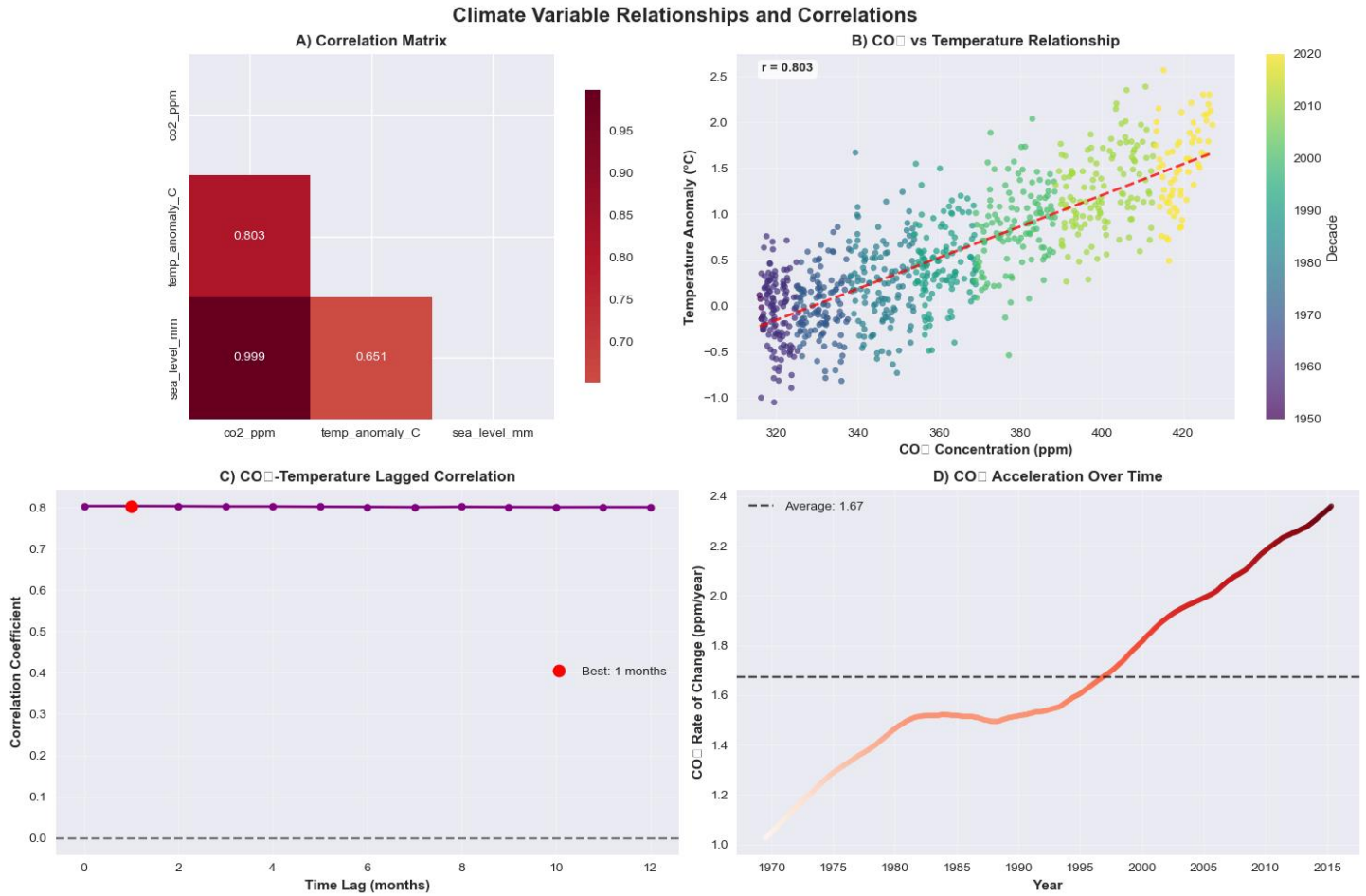


Correlation Analysis



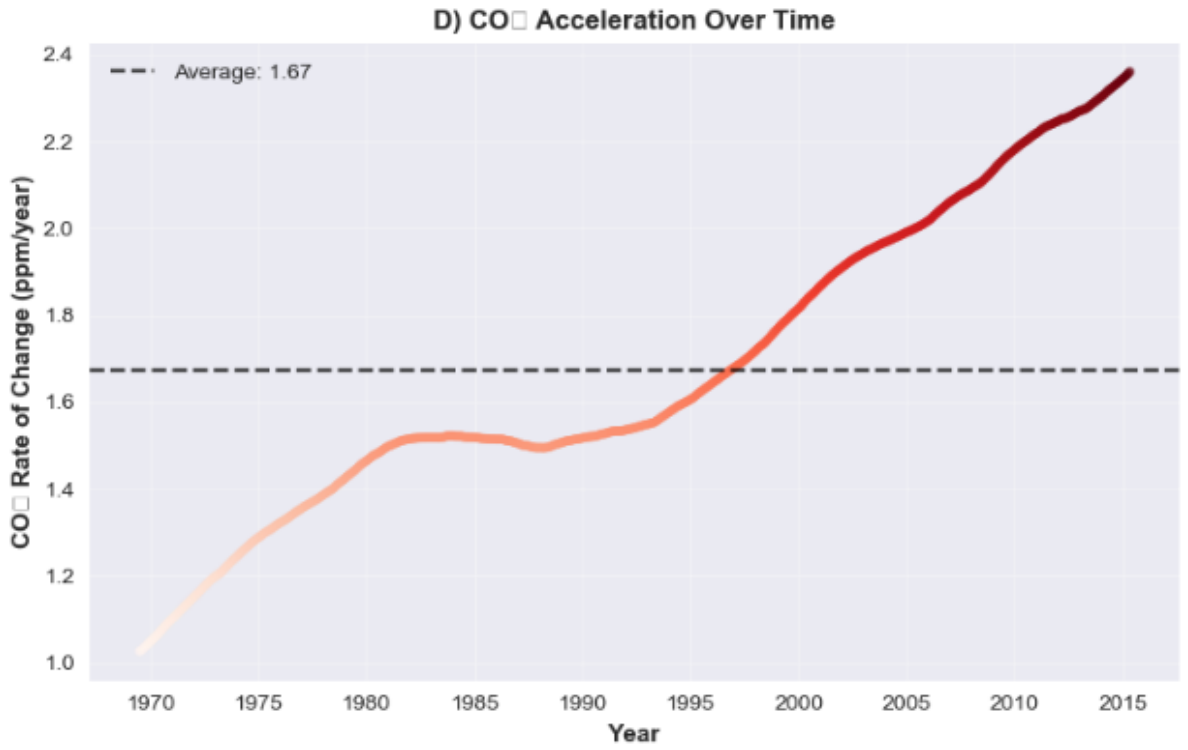
Correlation Analysis (cont.)

- Pearson correlation matrix
- Scatter plot (CO_2 vs. temperature, color-coded by decade)
- Lag correlation (1-month lag, highest at r ≈ 0.803)

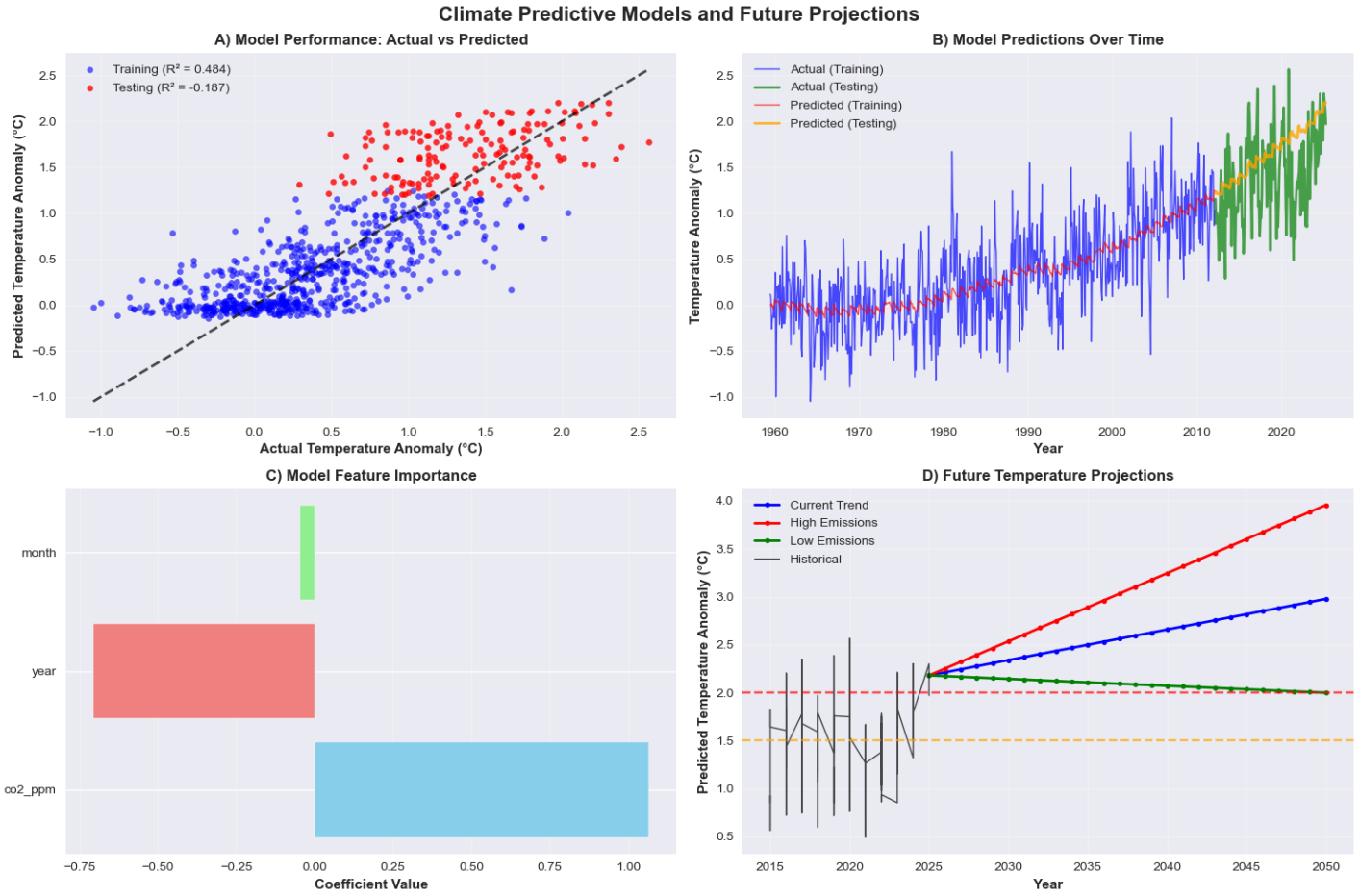


CO_2 Acceleration

- Change point detection post-1970
- Max acceleration, rate of increase as shown

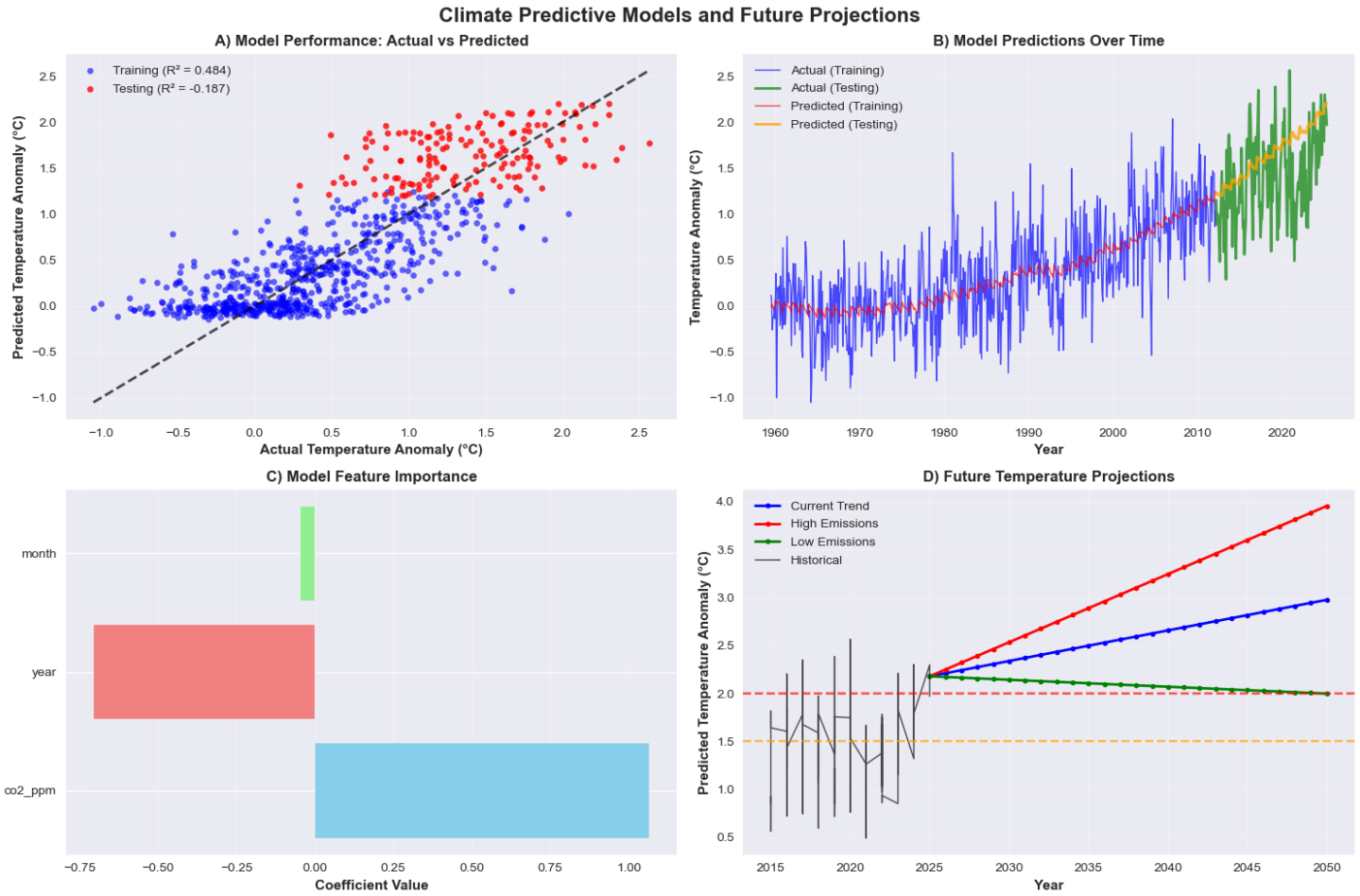


Predictive Modeling



Predictive Modeling (cont.)

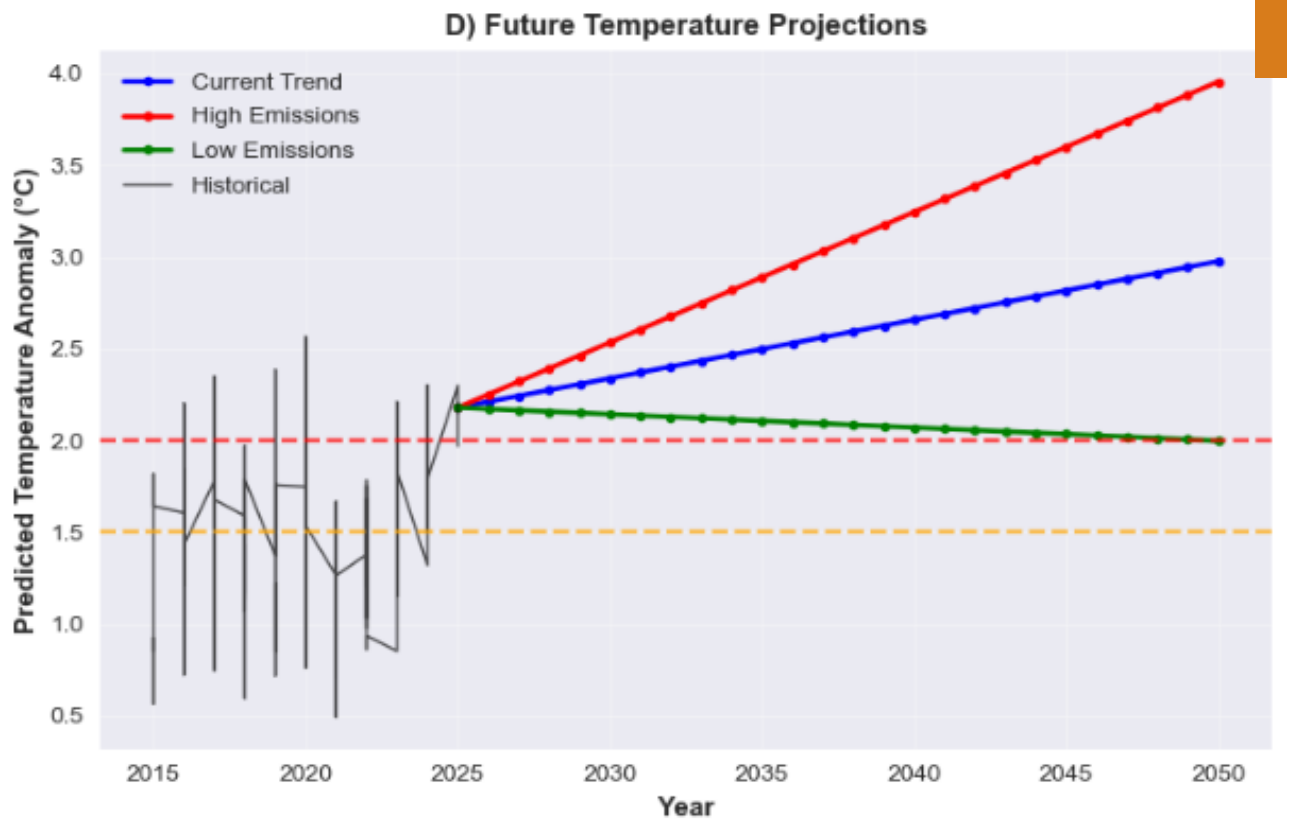
- Regression Results:
  - Train $R^2 = 0.484$
  - Test $R^2 = -0.187$ (possible overfitting)
- Model feature importance (CO_2 as dominant)
- Scatter plot for Actual vs. Predicted



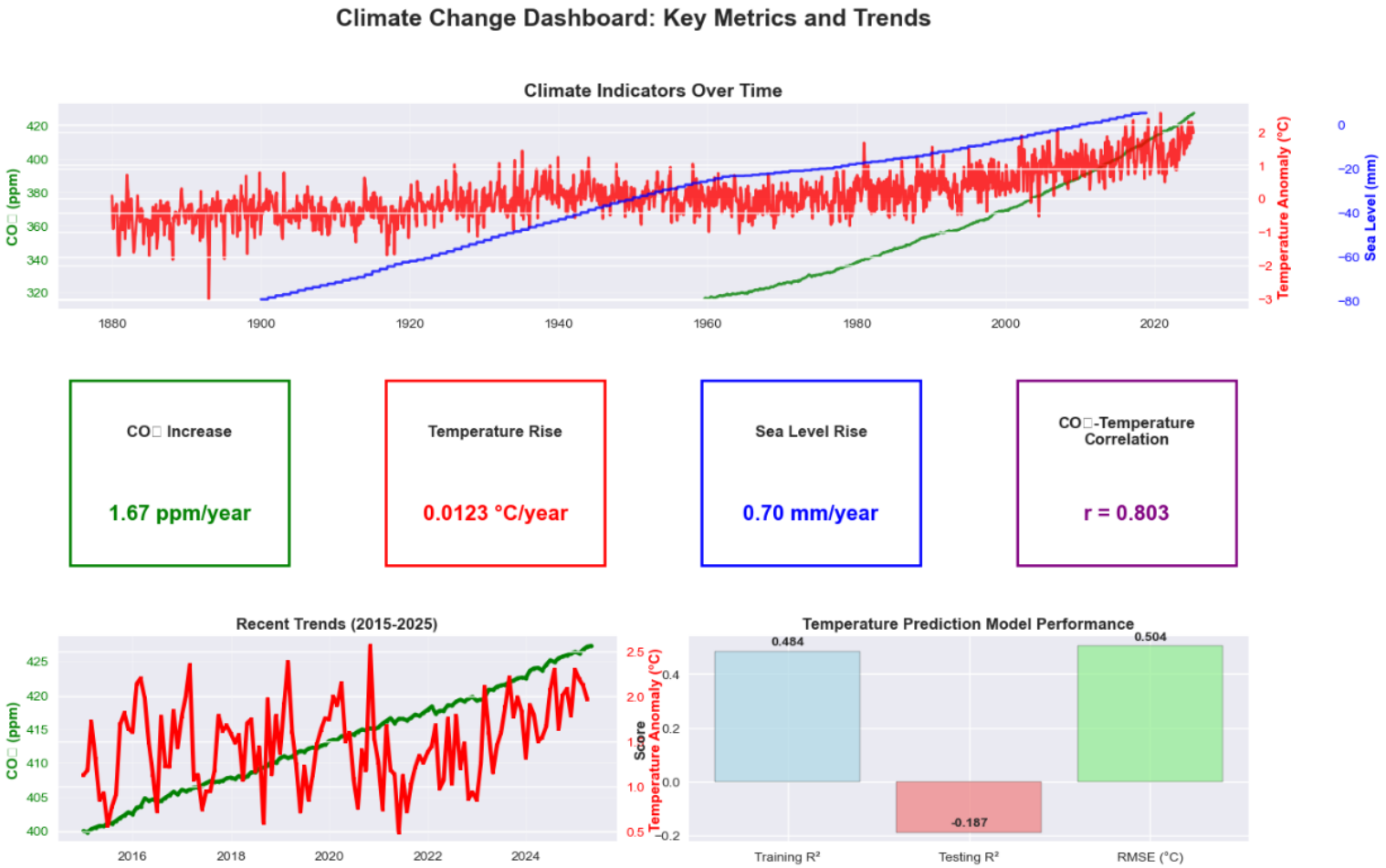
Future Projections

- Emission Scenarios:
  - High: CO_2 > 480 ppm (RCP8.5-like)
  - Low: CO_2 ~ 400 ppm (RCP2.6-like)

- Trajectories (Current vs. High vs. Low)

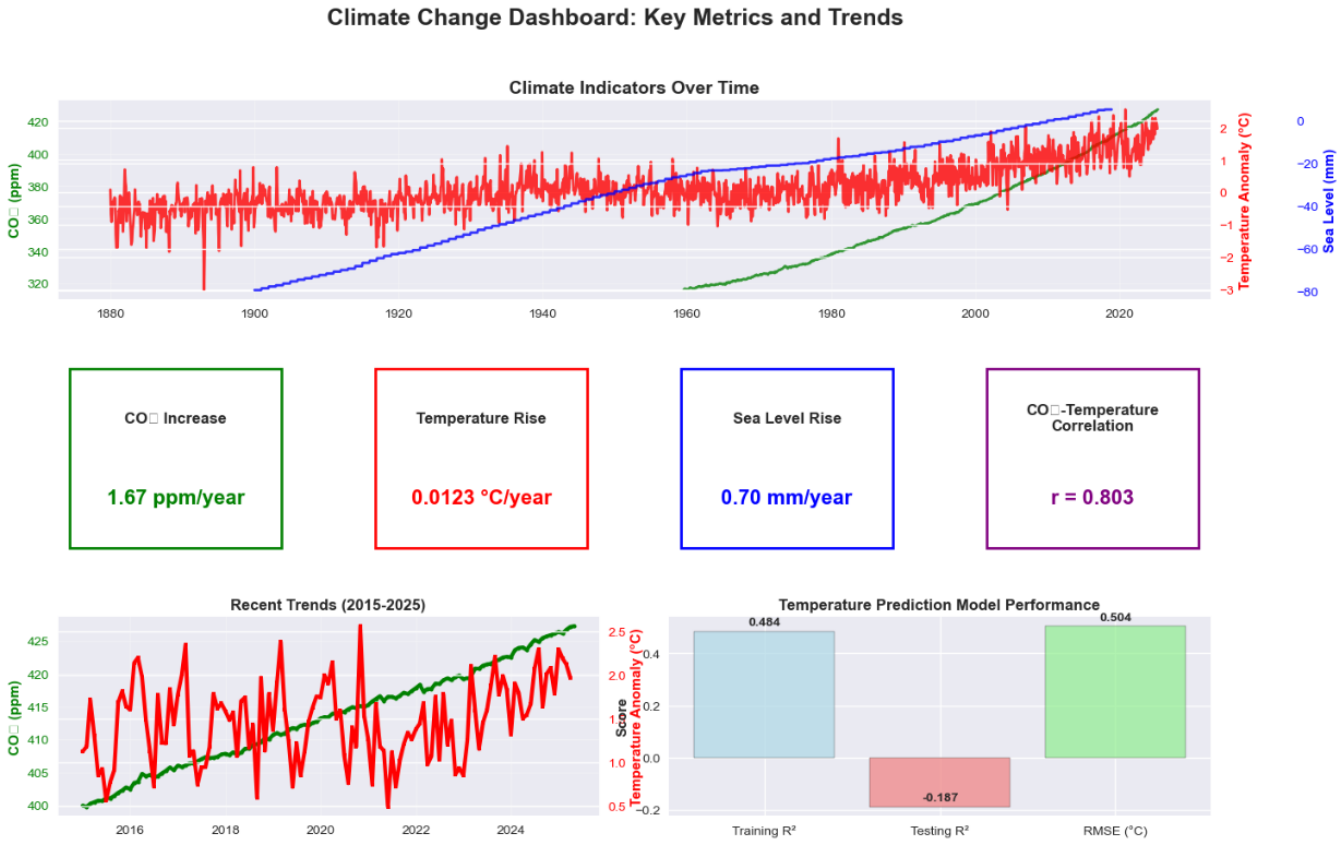


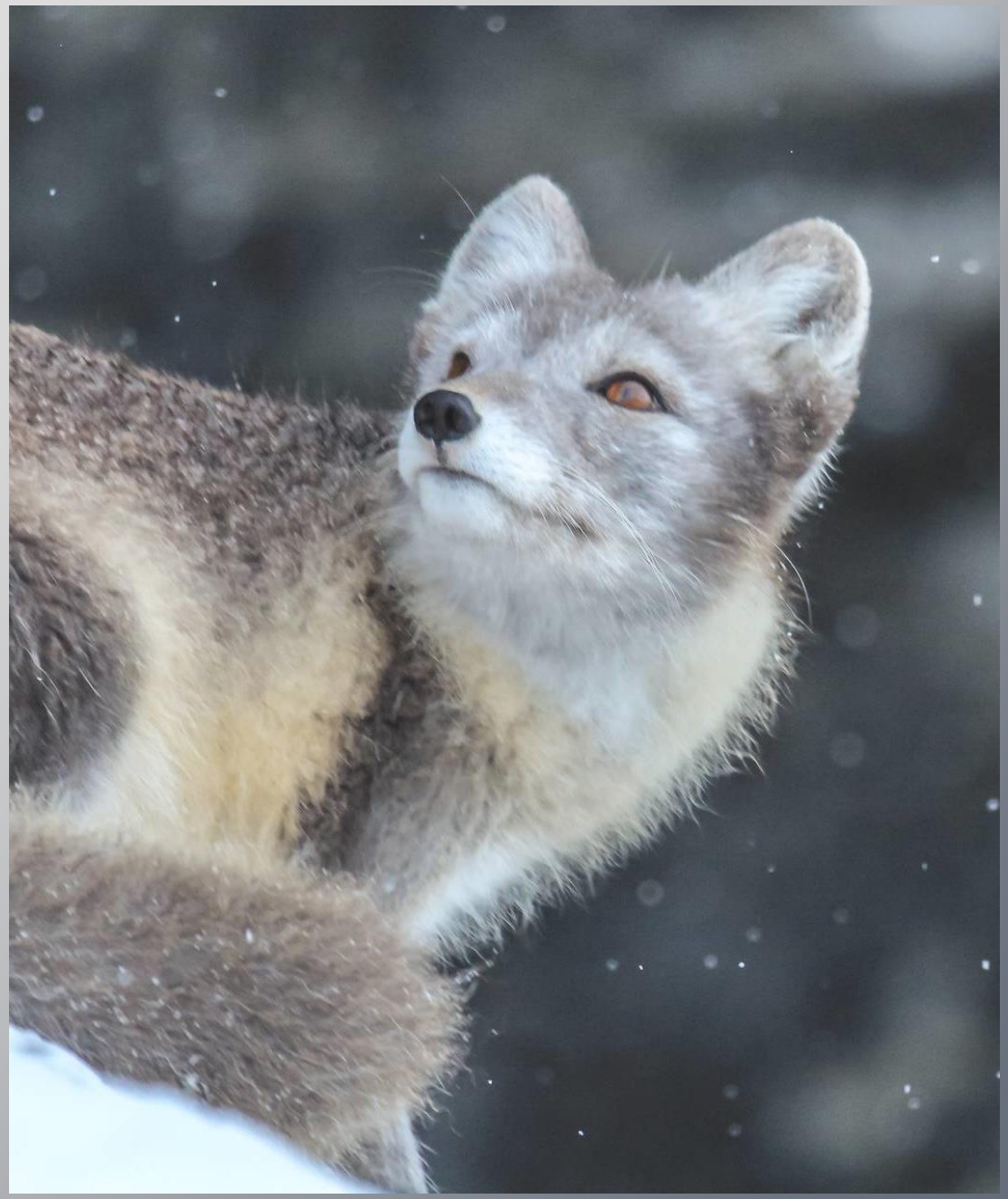
Comprehensive Dashboard Summary



Comprehensive Dashboard Summary (cont.)

- Key visuals: trends, correlations, model performance, and projections
- Enables exploration of CO_2, temperature, and sea levels over time
- Includes feature impact breakdowns
- Supports scientists, educators, and policy makers to explore various scenarios





Ethics and Limitations

- Avoiding alarmism, see through the lens of responsibility
- Potential for dataset uncertainty and model overfitting
- Dataset transparency: GISTEMP, Mauna Loa, JPL RECON

Conclusions and Recommendations

- CO_2 and temperature have strong, time-lagged correlation
- Sea level closely follows both variables with observed acceleration
- Predictive models offer useful signals, but further refinement will be needed
- Useful for education, planning, and further scientific validation

Questions?

Thank You!

Questions, thoughts, or follow-up? Let's connect.

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Portfolio: *Andres* – https://dre2322.github.io/portfolio/index.html; *Carlos* – https://carlose1977.github.io/portfolio; *Delilah* – https://dnsla.github.io/Portfolio/; *Tyler* – https://thfln.github.io/Portfolio

GitHub: *Andres* – https://github.com/Dre2322/; *Carlos* – https://github.com/carlose1977/; *Delilah* – https://github.com/dnsla/; *Tyler* – https://github.com/thfln/

Institution: Bellevue University – Department of Data Science – DSC450-T301 (Summer 2025)

This project was built using publicly available data from NASA GISTEMP, Mauna Loa CO_2 records, and NOAA JPL RECON.