NASA Global Land-Ocean Temperature Index Data Set Analysis

By Mitra Iyer

Introduction

- Climate change has been rapidly increasing in the past few decades
- Global warming is accelerating at an alarming rate

Question: *How does global temperature anomaly data show patterns of accelerated global warming?*

Introduction

PURPOSE

- Visualize acceleration patterns based on previous data
- Project future patterns of global warming

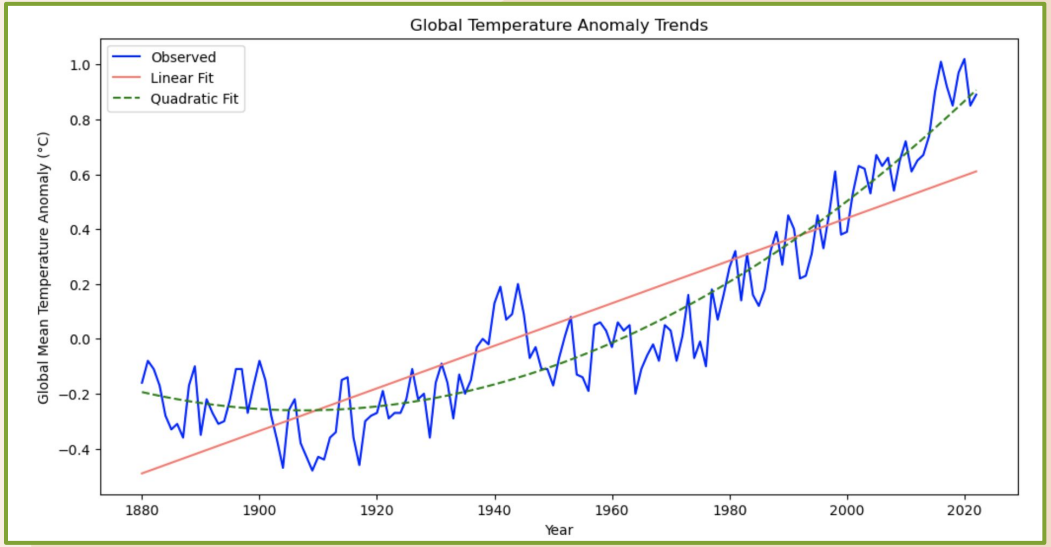
BENEFICIARIES

- NASA Researchers
- Scientists
- Governments
- General public

Methodology

- Obtained dataset through NASA STEM Search
  - Searched for Excel/CSV files
- Unit of Analysis: Years & temperatures anomalies
  - Temperature anomalies based on computed average for thirty year period of 1951- 1980.
- Derived Features: Decade/Five year analysis, trend lines, correlation lines
- Tools: JupyterLab
  - Python Libraries: NumPy, MatPlotLib, Pandas

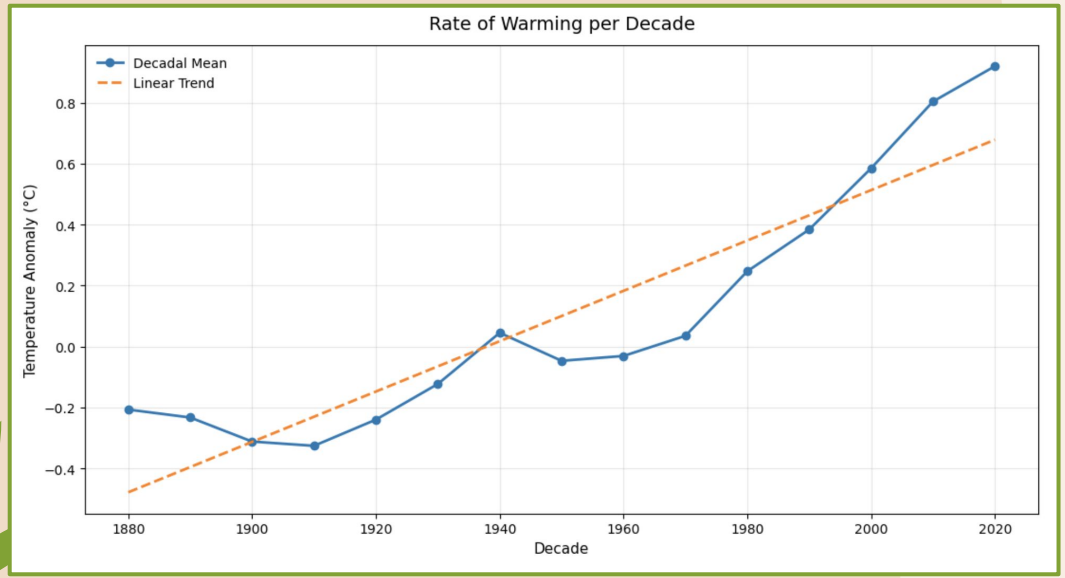
Graph 1: Does the global mean temperature anomaly show evidence of accelerated warming since 1880?




```
Quadratic coefficient = 0.000089
Positive quadratic term suggests accelerating warming.
```

- Positive trend of temperature fluctuation over time
  - Especially true from 1980 - 2022
- Quadratic coefficient shows steeper curve, meaning accelerated warming.

Graph 2: What is the rate of warming per decade, and has that rate accelerated?

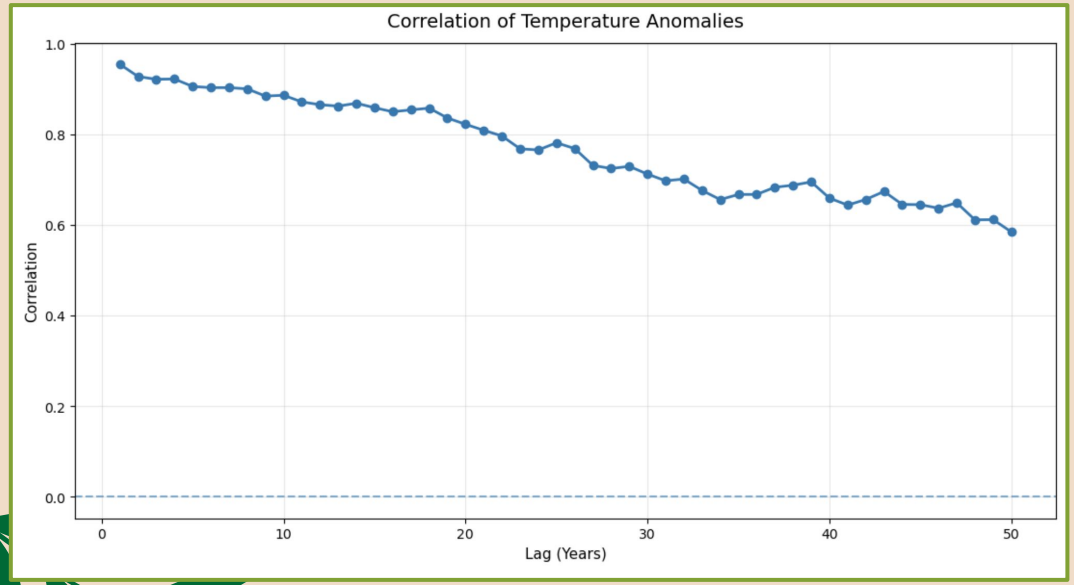



```
Warming rate: 0.08 °C per decade
```

```
Warming acceleration: 0.0002 °C per decade²
```

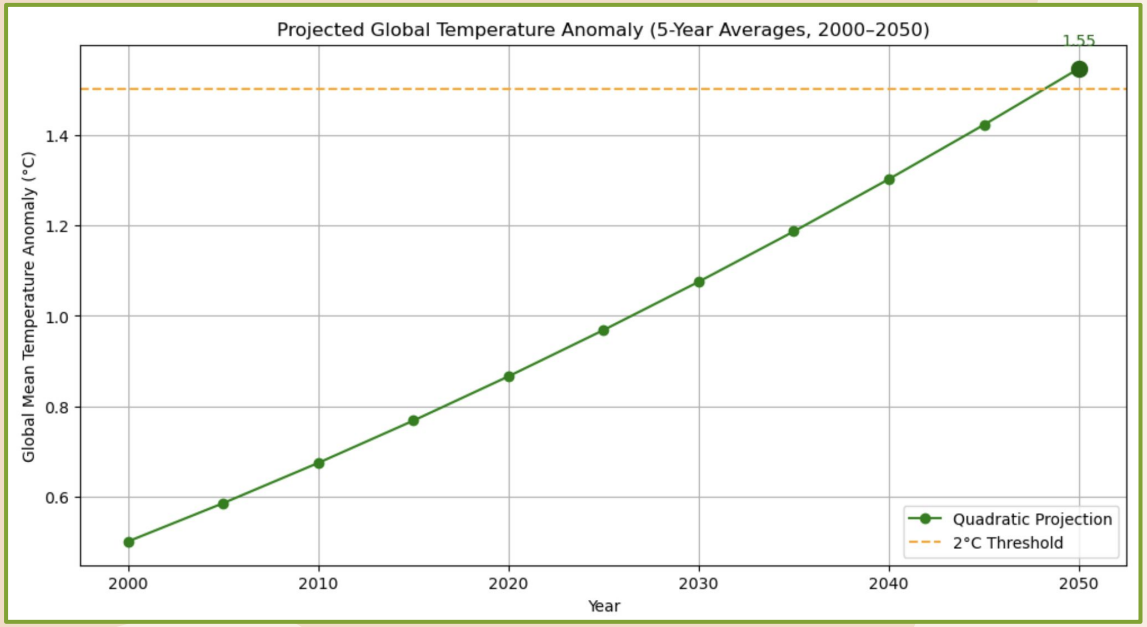
- Warming rate is increased
  - Positive trend in warming rate
- From 1960 to 2020 the warming rate increased significantly

Graph 3: Are there detectable periodic patterns in temperature anomalies, and are they linked to natural climate cycles?



- No unexpected dips, or peaks
- Steady trend down
- Natural climate cycles do not have a significant effect on temperature anomalies

Graph 4: Based on historical trends, when will the 1.5° C global mean anomaly be surpassed under accelerating warming scenarios?



- By 2050, the temperature anomaly will surpass the critical 1.5 ° C threshold
- Graph shows rapid acceleration within the next 25 years

Future Work

- Visualizing projections past 2050
- Examine how preventative measures for climate change could reverse/halt temperature acceleration
- Analyze the regional trends of temperature in New Jersey compared to other states.
    - What countries/industries contribute the most to climate change

Appendix

Dataset: NASA Global-Land-Ocean Temperature Anomaly Dataset

Head of Cleaned Data

]:

	year	temp anomaly
0	1880	-0.16
1	1881	-0.08
2	1882	-0.11
3	1883	-0.17
4	1884	-0.28

Correlation Data

	Lag	Correlation
0	1	0.954146
1	2	0.927160
2	3	0.921046
3	4	0.921727


Thank you!