

Satellite-Derived Global Temperature Trend Analysis

Objective

The objective of this project is to analyze long-term global temperature trends using NASA satellite-derived climate datasets and apply data analysis techniques to understand climate change patterns.

Dataset

The dataset used in this project is obtained from the **NASA GISS Surface Temperature Analysis**. It contains annual global temperature anomalies recorded from 1880 to the present.

Methodology

The dataset was cleaned and processed using Python. The following analytical steps were performed:

- 1) Visualization of annual global temperature trends
- 2) Linear regression to estimate the rate of global warming
- 3) Comparison of average temperature anomalies before and after 1980
- 4) Application of a 10-year moving average to smooth short-term fluctuations and reveal long-term climate trends

Results

The analysis shows a clear long-term increase in global temperatures. Linear regression estimates a warming rate of approximately 0.0083°C per year, indicating significant climate change over the past century.

The average temperature anomaly shifted from -0.148°C before 1980 to $+0.58^{\circ}\text{C}$ after 1980, confirming accelerated warming in recent decades. The 10-year moving average further highlights a consistent upward climate trend and reduces short-term variability.

Conclusion

This project demonstrates how satellite-derived observational datasets can be used to study Earth's climate system. The results confirm the presence of long-term global warming and show the importance of data-driven analysis in climate monitoring and scientific research.