Investigation of the Influence of Sunspot Cycles on Temperature Variability in New York City (1948–Present): A Preliminary Wavelet Analysis Approach

Colucci, D.[1] & Marsellos, A.E.[1]
[1]Department of Geology, Environment and Sustainability, Hofstra University, Hempstead, NY 11549
dcolucci@pride.hofstra.edu

This study represents an initial exploration into the relationship between solar activity and temperature variability in New York City, using historical data spanning from 1948 to the present. In this early-stage investigation, sunspot and temperature records were downloaded, merged, and normalized to ensure consistency across the datasets. Wavelet analysis was then applied to extract variable frequency components from both time series.

Preliminary findings indicate that the sunspot data prominently exhibits an approximately 11-year cycle as the dominant signal, alongside several minor periodicities that are partially obscured by this primary cycle. In contrast, the temperature data reveal a strong annual cycle with an exact 365-day periodicity, reflecting the regularity of seasonal variations in the region.

In addition to identifying these cyclic behaviors, this introductory research integrates a geohazard perspective by investigating when and how peak intensities in these variables might signal heightened risk. By correlating periods of intensified solar activity and temperature anomalies with historical geohazard occurrences, the study lays the groundwork for a forecasting framework that could eventually predict the timing of extreme weather events, urban heat stresses, and other climate-related hazards.

Future work will focus on advanced noise reduction techniques to isolate additional peaks in both datasets, followed by a detailed coherence analysis to further refine predictive capabilities for geohazard risk. This preliminary analysis serves as a stepping stone toward more comprehensive investigations into solar-climate interactions and their implications for urban resilience.