Temperature of the daylight with the night visibility of the planets

Rafaela Marson
Ottawa Hills High School

THE GLOBE PROGRAM
Global Learning and Observations to Benefit the Environment

Abstract

I decided to find my own methods for temperature and visibility measurements. I measured the temperature of the day light and the clouds. For the night data, I used a website called *wunderground.com* I correlated the temperature of the day with the visibility of the planets at night. I predicted that if the temperature of the day is hot, then the visibility of the night will be poor. After all my data was collected, I realised that I was right in my prediction.

Research Question

How does temperature during the day correlate to night sky visibility ?

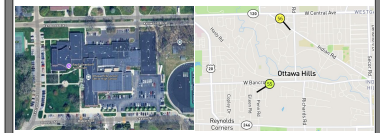
Why is it important? A scientist analyses the correlation between cloud cover and night sky glow due to pollution. “As the cloudiness increases in light-polluted areas, the brightness of the night sky glows also increases.” (Ścięzor, 2020). This particular information would be helpful not just for civilian stargazers, but for people like pilots and astronomers, so that they can be able to provide the visibility of the nighttime during the day with essential measurements.

Introduction

I wanted to know the patterns between temperature and night sky visibility so that it could be easily predicted on a day-to-day basis. More specifically, *how do temperatures during the day correlate to night sky visibility?* Scientific articles have been written about night sky visibility and how to measure it, but none seem to directly analyze temperature and night sky visibility.I believe that if the temperature changes then the night sky visibility will also change because depending on a certain temperature, more or less water particles on the ground evaporate, like fog. If the temperature is higher, then the number of particles will be more, making visibility lower.Because of a gap in specific research, I decided to find my own methods for temperature and visibility measurements. Although we could not utilize a physical Sky Quality Meter Lens, there were multiple alternative methods. We chose to look into the “Planets Visible” archive from *timeanddate.com* “The header on the Night Sky page shows the current Moon phase, along with information about the night time at your location.”. This website provides a clear and accurate reading of specific data such as date, time, location, and graphs. Looking into the registers gives me opportunities to compare my temperature readings with the visibility in the sky from that night without having to record extra data.

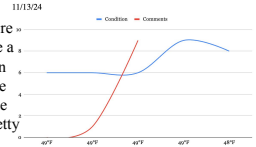
Research Methods

I first chose my question: *How does temperature during the day correlate to night sky visibility ?* I hypothesize that if the temperature changes then the night sky visibility will also change because depending on a certain temperature, more or less water particles on the ground evaporate, like fog. To prove my point, I had to start a research about the topic. I first measured the temperatures and clouds. For the measurements in the daylight I collected them in the parking lot of the Ottawa Hills High School. The temperature I used a determined thermometer and for the clouds identification the Cloud Protocol Data Sheet. On the other hand, of the night measurements I used the website weather underground that uses the weather station Reynolds Corners which is the nearest to my High School. After I had all the data collected, I compared the temperature of the daylight with the visibility of the planets in the night. I made a table with all the information I collected and started analyzing. With my conclusions I can confirm that my hypothesis was correct. This happens because when the weather is hot, water from rivers, lakes, water reserves and oceans evaporates making the clouds get bigger.

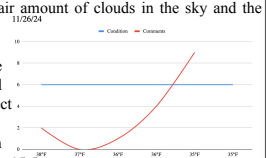


Results

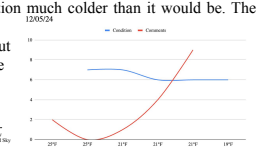
The day I collected my first data (11/13/24) at daylight the sky is pretty visible, with a few clouds, light blue color. The temperature at the day was around 40F and humidity of 50% making the thermal sensation the same as the actual temperature. On the other hand, at night, after the sunset, with the temperature about 49F, there are on average a lot of clouds in the sky, but the visibility of the planets are pretty clear.



The day I collected my second data (11/26/24) at daylight the sky was about the same as the first one with few clouds. However the temperature of this day was lower- around 46F with humidity of 60%. At night, there were a fair amount of clouds in the sky and the temperature fellto 38F. The visibility of the Planets are still good and perfect taking of Neptune which was hard to see.



The day we collected our third data (12/05/24) at daylight the sky was overcast and opaque and was snowing. The temperature was about 25F. At night the temperature was the same as the day with light snow and cloudy with a humidity of 90-95% making the thermal sensation much colder than it would be. The planets were very visible, but the same as the second day, Neptune was difficult to see.



Discussion

To study the night sky visibility of the planets, stars and moon it is necessary to have an understanding of two factors to have a clear or not sky, the temperature of the daylight and the clouds. The clouds are vapor water condensed. Depending on the temperature of the day, it will be more cloudy or not the sky. On hot days that the temperature is higher, more water will condense making more clouds in the sky. That means that on winter days, the visibility of the sky at night has to be cleaner than on hot days. This claims that my hypothesis is right. If the temperature changes then the night sky visibility will also change because depending on a certain temperature, more or less water particles on the ground evaporate, like fog.

Conclusions

The temperature of the day lights affects directly with the visibility of the sky at night. The visibility of the sky at night is the amount of clouds present, making it difficult or easier to see the stars, planets and the moon. If the sky has a larger amount of clouds at night, it means that the temperature of the daylight was higher. That is caused because the water of rivers, oceans and water reserves evaporates with the temperature- condensation making it expand in the air causing more clouds to be in the sky.

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