Cloud Patterns in Weather

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Abstract

The purpose of this project is to determine how clouds influence the weather. The hypothesis states: If clouds significantly influence weather patterns, can clouds' composition, formation, and movement be reliable indicators for forecasting weather conditions in the upcoming days? I used Globe protocols and other tools to collect and measure data. Although the project didn't support the hypothesis, it provided valuable data for other projects. This experiment was conducted throughout September 2024 and only measured the fall, leaving other seasons open to research and possibly different results.

Introduction

If clouds significantly influence weather patterns, can clouds' composition, formation, and movement be utilized as reliable indicators for forecasting weather conditions in the upcoming days? In our fast-paced, modern world, clouds are often taken for granted, overshadowed by the

immediacy of news updates and weather apps. People frequently ask why it's cloudy, or no clouds. Yet, they rarely consider the complexities of specific weather phenomena, such as the intriguing combination of cloudiness and warmth. This research paper delves into the multifaceted role of clouds, not only in shaping daily weather but also in influencing geopolitical dynamics. Clouds are far more than mere formations in the sky; they affect satellite communications, contribute to rainfall, and create breathtaking scenes that can elevate our spirits. During a moment of reflection amid the chaos of everyday life, I began to contemplate these phenomena, which inspired my investigation into the intricate relationship between clouds, weather patterns, and their wider implications. This exploration seeks to illuminate how clouds shape our environment, influence our experiences, and even impact our interactions on a global scale.

In the atmospheres of our planet, a total of 17 distinct types of clouds can form, influenced by various factors, including temperature, humidity, geographical location, and time of year. Among these, stratocumulus clouds are the most prevalent and can be identified by their clumpy or patchy appearance. The formation of stratocumulus clouds requires specific atmospheric conditions, namely a relatively moist and unstable atmosphere coupled with wind, which contributes to their large, distinct clusters. Understanding these clouds and their formation processes is essential for meteorological studies and weather prediction.

Similar to the stratocumulus cloud, the altocumulus cloud features a large, puffy, whitish appearance. However, these two cloud types differ in their altitude and formation. Altocumulus clouds typically form at a higher elevation and are characterized by smaller, clustered formations, contrasting with stratocumulus clouds' more clumpy and extensive nature. The formation of altocumulus clouds requires specific atmospheric conditions, particularly the

presence of windy, upward-moving air currents that initiate the breakup of altostratus clouds, leading to puffy white small clouds that come in clumps.

The stratus cloud represents the first type of flat, sheet-like cloud formation. These clouds create a distinct, uniform cover over the landscape, characterized by their gray, expansive appearance. Unlike the other cloud types, which tend to be lumpy and white, stratus clouds exhibit broad gray areas in the sky. These clouds are typically associated with light precipitation, resulting in either rain or mist. Stratus clouds form under specific atmospheric conditions, primarily when cold, breezy air is saturated with moisture. They are commonly found in moisture-rich environments, such as swamps, large lakes, and oceanic regions. The presence of sufficient moisture in the atmosphere, combined with the appropriate temperature gradients, facilitates the development of these layered cloud structures.

I was intrigued by the development of clouds and their impact on the world. Therefore, my project focused on how clouds impact the world and what we could learn from them.

Methods and Materials

To conduct this experiment I relied on a procedure provided by Globe to help eliminate human error.

- First, check the weather conditions with a weather app
- Second check what the sky looks like

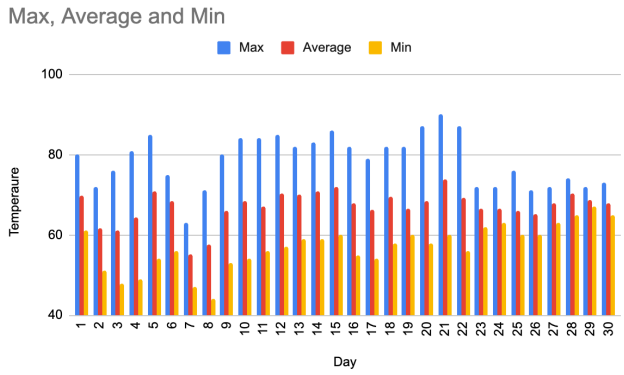
- Third, Record the temperature and cloud conditions in GLOBE
- Finally, wait a day and repeat the procedure.
- The location of the target area was the Ottawa Hills School senior parking lot.

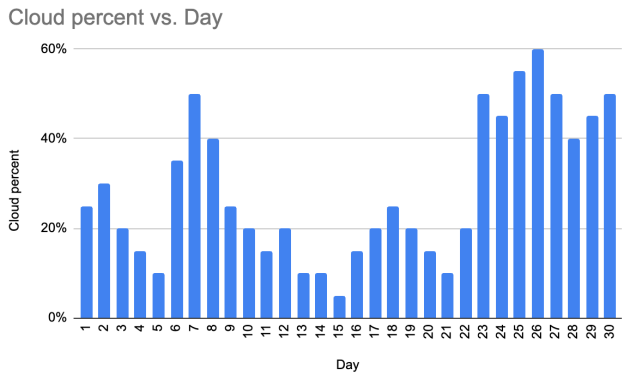
The materials I used for this experiment are simple and readily available. Materials used for this experiment include but are not limited to

1. A computer, for uploading data
2. A weather app, for looking at the temperature
3. Finally, sky because you need the sky to look at clouds.

I acquired the Globe cloud procedure for this experiment and made one small change where I added the need to utilize the sky for the temperature part of my experiment. For the location, this experiment was performed in the Ottawa Hills High School parking lot by the track. I repeated this procedure 30 times once each day.

Presentation of Data and Results





The data in Table 1 shows the temperature for each day throughout September. The blue lines represent the maximum temperature for each day, while the yellow lines represent the lowest temperature for each day. The most important piece is the red line, which shows the average temperature for each day. The second table shows the percentage of clouds in the sky for each day. The higher the lines the more clouds and the lower the lines the lower the clouds in the sky. Each day matches up through table one and table two.

Analysis and Results

This study explores the intriguing relationship between cloud types and subsequent weather

patterns. It indicates that different cloud formations do not appear to influence weather conditions. Although the data suggests that the experiment did not yield significant results, it is worth considering underlying patterns related to cloud dynamics that are not immediately apparent from Earth's vantage point.

Perhaps atmospheric processes or interactions are occurring at different altitudes or in regions beyond our direct observation that could play a crucial role in shaping weather outcomes. This suggests the possibility of complex cloud behaviors that warrant further investigation. Future research could focus on utilizing advanced technologies, such as satellite imaging and atmospheric modeling, to uncover these subtle yet impactful patterns and enhance our understanding of cloud interactions in the atmosphere. As the hypothesis stated: If clouds significantly influence weather patterns, can clouds' composition, formation, and movement be reliable indicators for forecasting weather conditions in the upcoming days? This was proven wrong because no significant pattern appeared to help prove the point.

Conclusion

The project was expected to have a result that would support the hypothesis however the science said otherwise and I ended up disproving my hypothesis. The two procedures were chosen for ease of use while being able to be completed multiple times in a row. The data tells

us that fact clouds don't specifically tie to a temperature range and depend more on the atmospheric conditions. The data however does help in research of atmospheric conditions and other projects relating to weather. In the end, the hypothesis was wrong yet data was collected and this could help in future research.

Discussion

If I were to redo this project, I would implement several upgrades. More protocols would be essential for obtaining better and more accurate results. When analyzing clouds, I would focus on identifying specific types, such as stratocumulus and altocumulus, rather than just measuring coverage percentage. I would also dedicate more time to data collection and organization. Although the data did not contribute significantly to my project, it could still be valuable for other projects that focus on atmospheric patterns related to temperature or cloud formation, such as stratocumulus, altocumulus, etc. instead of coverage percentage. I would spend more time on the collection and putting the data together. Even though the data did not help my project it could be valuable to other projects focusing on atmospheric patterns related to temperature or clouds.

Acknowledgments

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