Clouds Second Report
MCEN 4151-001: Flow Visualization

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Introduction

On October 1, 2023 at 8:23 PM, this photograph was captured from the side of the road in Colorado Springs, Colorado. The photograph captures altocumulus clouds, which is a type of cloud that forms in altitudes ranging from 7,000 feet to 20,000 feet in altitude [1]. The elevation this image was taken at was 5681 feet,allowing for the image to capture various layers of clouds. The intent of this image was to highlight a different cloud formation, and visualize the beauty behind it.

Figure 1: Final edited image for clouds second assignment

Circumstances of Image

The photograph, depicted in Figure 1, was taken from the side of the road in Colorado Springs, Colorado. The elevation at this location was approximately 5681 ft above sea level. I placed my camera in between the car door and the car frame, to stabilize the image. The camera was facing 210 degrees SouthWest, and the picture was taken at 8:23 PM The camera angle from the ground was roughly 15 degrees above the horizon. An image of the setup is provided below:

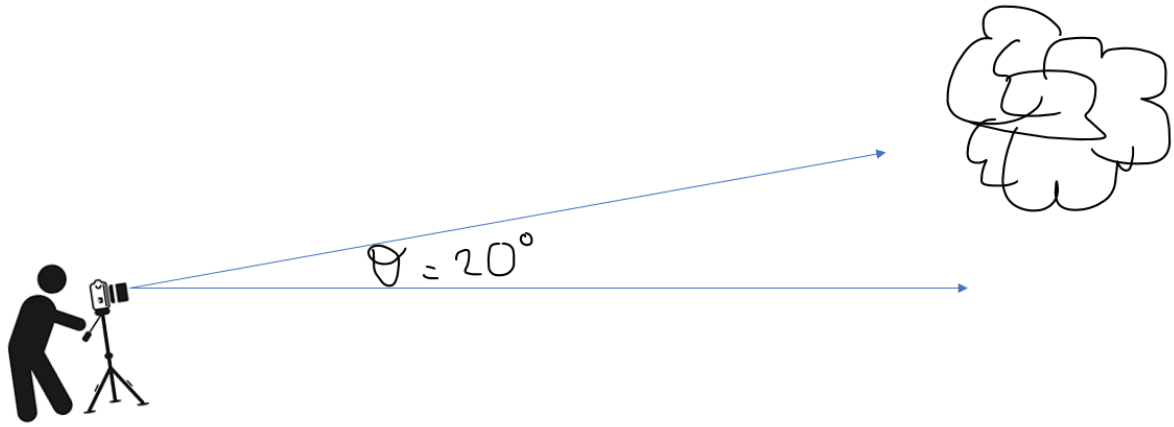
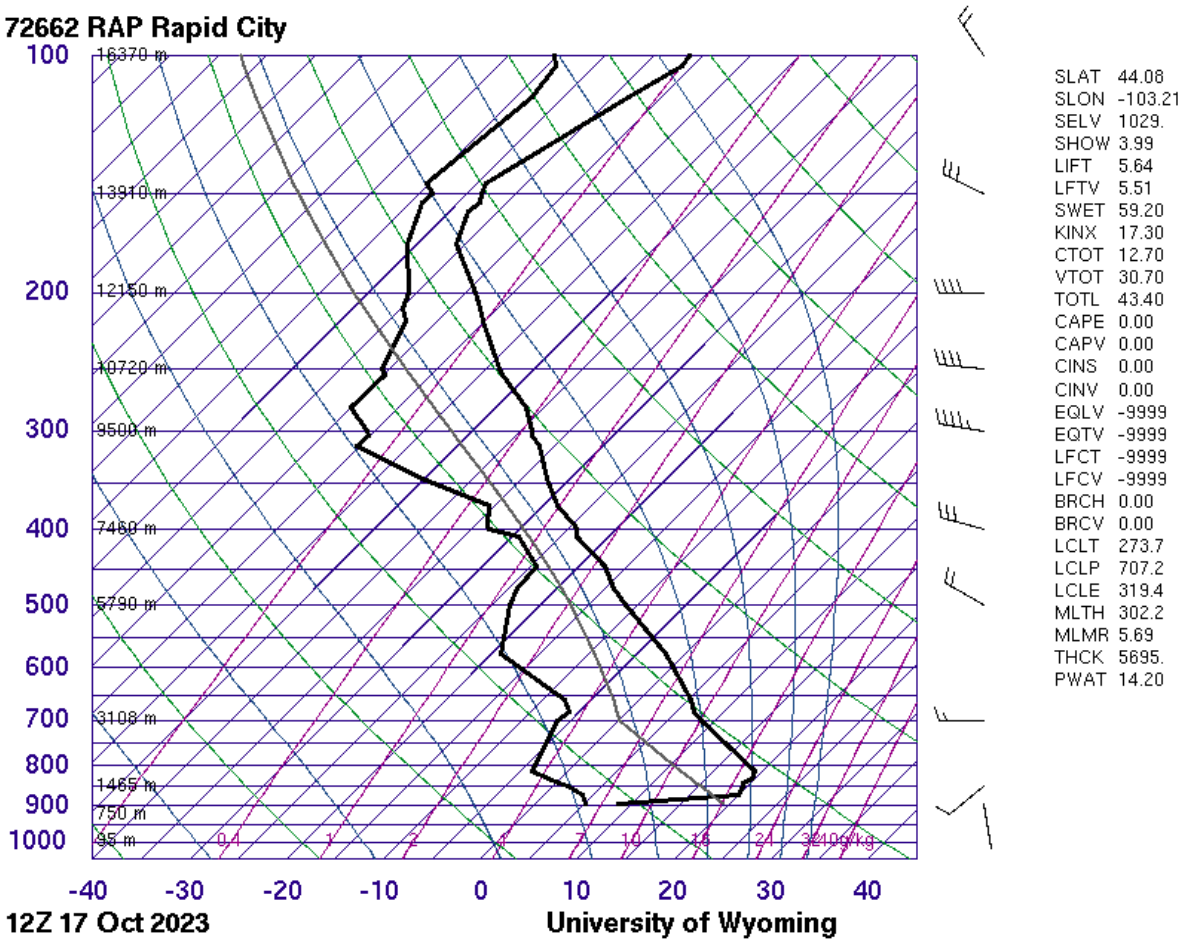


Figure 2: Camera setup for the final photograph

Physics of Flow

The clouds in the image are Altocumulus clouds. Altocumulus clouds form as a result of the width of the cloud being approximately one and three fingers wide [1]. The Altocumulus is a mid to high level attitude that can be characterized as masses or rolls in layers. As seen in the final picture the most likely combination is patches and rolls in layers. It can be seen that there are three main layers within the photo. The three categories are broken up into high altitude clouds, masses at middle attitude, and then the layers that connect both layers [2]. The average temperature this picture was taken at was 58 degrees Fahrenheit, and there was not an ounce of wind. So based on these observations the atmosphere was most likely stable during this period of time. The Skew-T diagram for this day is provided below:



Visualization and Photographic Techniques

The visualization technique used in the photograph is an example of a marked boundary [1]. The images illustrate the distinction between the three layers of clouds within the landscape. The size of the field of view is approximately 2 miles. This is because the road I was on is approximately 2.5 miles from the mountain range, and the clouds seem to appear about half a mile away from the mountain range. The camera used was a Canon EOS R6 Mark II with the following settings:

Lens Focal Length	30mm
ISO	100
Shutter Speed	1/1160 s
Aperture	f/6
Image Size	6000 x 4000 pixels

Table 1: Camera settings used in the final photograph

Conclusion

The image reveals the relationship between a stable atmosphere and the different layers of clouds that can be observed. In this image I like how the colors fade away from the mountains due to the sunsetting in the west. I wish I could have gotten a closer view of the clouds and adjusted my focal length of the camera lens. For further exploration I would like to create a folder of all the cloud types for a week from the same location and at the same time. This would allow me to observe the effects of the atmosphere conditions and determine what cloud conditions are ideal for certain groups of weather.

References

[1] Hertzberg, Jean. "Flow Vis Guidebook." Flow Visualization, 13 July 2023, www.flowvis.org/Flow%20Vis%20Guide/overview-3-lighting/

[2] "Denver Colorado Weather & Temperature Info." *Visit Denver*, www.denver.org/about-denver/resources/weather/. Accessed 17 Dec. 2023.