Clouds First Report

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MCEN 5151: Flow Visualization

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I.   Overview

This image was taken for the first Clouds assignment for MCEN 5151: Flow Visualization. For this assignment, we were tasked with observing and photographing different clouds over the first half of the semester. I chose this image due to the variety of different shapes and types of clouds and the iridescence in the center of the image.

II.   Image Location and Context

This image was taken in the North Open Space in Louisville, Colorado on September 28th at 6:02 PM. This day, sunset was at 6:50 PM so the sky was beginning to darken at the time of the image. This image was taken facing South-West at an angle of about 20 degrees above the horizon. Louisville is at an elevation of 5,338 ft.

III.   Cloud Identification and Physics

Figure 1, below, is the Skew-T diagram for Grand Junction, CO for the date and time that this photo was taken [2]. Grand Junction is about 250 miles from Louisville, CO.
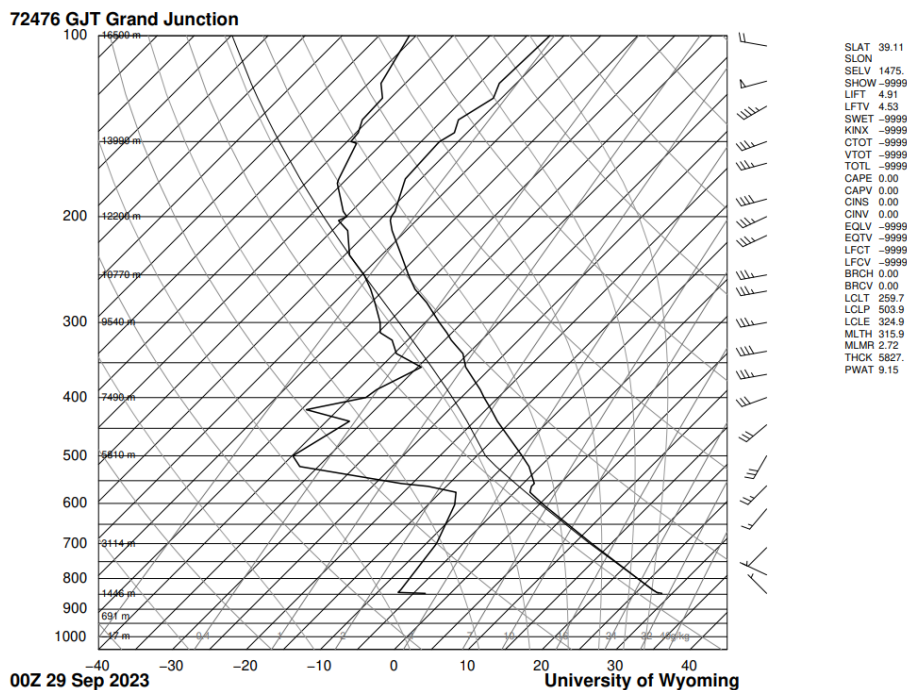

Figure 1: Skew-T diagram.

The Skew-T diagram shows that there were likely clouds around an altitude of 4,500 meters and also within the range of 8,500 meters to 12,200 meters above sea level, which corresponds to an altitude of 2870 meters and 6,870 to 10,570 meters above ground level. These are the points in the diagram where the dewpoint line (left) and temperature line (right) are the closest. The atmosphere was stable at this point in time, as shown by the CAPE value of 0.0. The wide range

in cloud elevation indicated by the Skew-T diagram correlates to the different types of clouds shown in the image.

The weather was relatively calm the day that this image was taken. The wind speed at this time was about 4 mph, the temperature was about 75 F, and there was no rainfall at any point during the day [3].

This image includes a few different cloud types. It features some cumulous clouds towards the foreground of the image and cirrostratus near the top. The cumulous clouds shown at the base can be identified by their puffy shape and low altitude. These clouds typically have flat bases and have a dense appearance [4]. The cirrostratus clouds form at a higher altitude than cumulous clouds. These clouds are thin and wispy and often cover a significant portion of the sky [5].

The iridescence in the center of the image was formed by light refracting off of the ice crystals and water droplets in the cloud [6].

IV.   Photographic Technique

This image was taken on an iPhone 13 Pro Max, with a focal length of 9 mm. The exposure was set to 1/673, the aperture to f/2.8, and the ISO to 32.

Figure 2: Original, unedited image.

The original image, shown above in Figure 2 has dimensions of 4032 x 3024 pixels. While editing this image, I significantly cropped it to remove the trees at the bottom of the image and to bring the viewers focus to the iridescence at the center of the image. Additionally, I increased the contrast and the saturation. The edited image has dimensions of 5000 x 3750 pixels.

V.   Image Conclusions

Overall, I am very happy with this image. I really like the variety in the types of clouds shown and I think that the iridescence in the middle of the image adds a unique feature that sets this image apart from the other cloud images I took this semester. However, I dislike how much I had to crop the image to remove the trees from the image to focus on the clouds. I think that this cropping led to the removal of some interesting clouds on the periphery of the image. If I were to retake this image, I would try to walk to the other side of patch of trees in order to get a wider view of the clouds themselves.

VI.   References

[1] "September 2023 - Louisville, Colorado - Sunrise and sunset calendar." *Sunrise Sunset.*
https://sunrise-sunset.org/us/louisville-co/2023/9

[2] *University of Wyoming.* https://weather.uwyo.edu/upperair/sounding.html

[3] "University of Colorado ATOC Weather Network." *Skywatch Observatory.*
https://skywatch.colorado.edu/

[4] "Ten Basic Clouds." *National Oceanic and Atmospheric Administration.*
https://www.noaa.gov/jetstream/clouds/ten-basic-clouds

[5] "Cirrostratus clouds." *UCAR.* https://scied.ucar.edu/image/cirrostratus-clouds

[6] "Iridescent clouds have rainbow colors." *Earthsky.* https://earthsky.org/earth/iridescent-
clouds-have-rainbow-colors/