

Cloud First Report

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MCEN 5151 - Flow Visualization Type of Cloud(s): Cumulus, Stratocumulus, and Cirrus Date and Time: 09/08/2019 at 11:50 AM Location: Grand Lake, Colorado

October 28, 2019

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1 Background



Figure 1: Cloud first submission.

Figure 1 is the final photo submitted for the Cloud First assignment. I planned a camping trip to Grand Lake, Colorado (altitude 8,369 feet) to capture clouds at higher altitudes. I set out to capture a wide variety of cloud types within one picture. The mountains were experiencing a lot of precipitation that weekend. The moisture in the air allowed an abundant array of clouds to develop in the sky. I woke up to a partly cloudy sky and decided to go on a hike to photograph the clouds. The trail that I hiked is called Stillwater Trailhead. I began to hike at about 10 AM and I took various pictures along the trail.



2 Location, Date, and Time



Figure 2: Latitude and longitude.

Figure 2 is the exact latitude and longitude where I camped in Grand Lake, Colorado. The campsite is part of a designated primitive camping area; as such I cannot refer to it by any name.



Figure 3: Original and consecutive photo(taken one hour apart).

Grand Lake sits at an elevation of 8,369 feet (2,551 m). It is home to the largest and deepest natural lake in Colorado. I was able to decipher the direction of the cloud movement by using the lake as reference in my photos. The camera was facing south-east in the photos



in Figure 3–in the direction towards Boulder, Colorado. From the tip of the cloud formations, it is clear that the clouds are moving perpendicular to the direction of the camera. As such, it is safe to conclude that the clouds were moving north-east.

The camera was directed at a 45 degree angle from the horizon in the final image submission. It was taken at exactly 11:50 AM on September, 08, 2019.

3 Cloud Information



Figure 4: Skew-T Plot for 09/08/2019.

Scattered showers were predicted for that weekend. I arrived at the campsite at 7 PM on Friday afternoon. It began to rain shortly thereafter. It rained through the night but, in the morning, the rain had subsided and gave way to mostly sunny skies. I took my photo that morning. Scattered showers returned in the afternoon and continued through the night.

Figure 4 is the Skew-T plot for the day that my image was taken. The plot shows that, on the day my photo was taken, clouds were able to form at altitudes between 5000-5500 meters and 9500-10300 meters. Using the skew-t plot, we can explain this by looking at the distance between the dew point (thick black line on the left) and the temperature



(thick black line on the right). As air mass rises, it tends to cool with increasing elevation. When the air mass reaches a temperature at which the atmosphere can no longer hold the moisture as waster vapor, the air starts to condense. This leads to the formation of clouds. Referring back to the skew-t plot, we can see that the distance between the dew point and the temperature are closest at altitudes between 5000-5500 meters and 9500-10300 meters. At these altitudes, clouds were likely to form. Moreover, another important feature of the skew-t plot is the CAPE value. The CAPE value on this particular day was 448.1. This indicates that the air was unstable. Instability is the condition in which air will accelerate upwards due to positive buoyancy. This rise in air is associated with thunderstorms.



Figure 5: Cloud types.

My image captured three types of clouds. They were cumulus, stratocumulus, and cirrus. Cumulus and stratocumulus are low-level clouds. They form at altitudes below 2,000 meters. Cirrus is a high-level cloud. It forms at altitudes above 7,000 meters. My image (Figure 1) and the information presented in the skew-t plot on the day it was taken match perfectly. The puffy-and-tall cloud in focus is a cumulus cloud. It is suspended at an altitude of about 5,000 meters (2,500 meters more than the elevation on which I was standing). The long-and-thin clouds behind it are stratocumulus clouds. They are suspended at a bit of a higher altitude than the cumulus cloud. Furthermore, the wispy-and-thin clouds at the top of the photo are cirrus clouds. These clouds are typically suspended at an altitude of approximately 10,000 meters.



4 Photographic Technique

The field of view of the original image is 4548 x 2754 pixels. I shot the photo at a distance of approximately 2,500 meters from the end of the lens to the cumulus cloud. Table 1 breaks down all the properties that I used to capture the original image.

Property	Value		
Camera Maker	Canon		
Camerica Model	EOS Rebel T6		
ISO	ISO-100		
F-stop	f/10		
Exposure Time	1/800 sec.		
Flash Mode	No Flash		
Focal Length	40mm		

 Table 1: Camera Properties

Moreover, I used Photoshop to edit my image. I cropped-out the tree on the bottomright to keep the focus on the clouds. Then, I used the magic wand tool to only select the boundary of the cumulus cloud. This allowed me to increase the contrast within only the selected area. I did this to create depth and it made the cumulus cloud the focus of the image.

5 Conclusion

In conclusion, the image I submitted for this assignment captured three different clouds; namely cumulus, stratocumulus, and cirrus clouds. I am pleased that I was able to capture more than one type of cloud. I also like the framing of the image, as it kept the clouds in focus. For upcoming cloud assignments, I will strive to maintain the integrity of the phenomenon in the photo by keeping the color of sky as realistic as possible.

