Clouds 1 Report:

Unedited photo

David Milner
MCEN5151
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Photo Information:

Taken on:	10/1/2022
Type of Cloud:	Cumulonimbus
Time of photo:	3:30 PM
Location of photo:	Waneka Lake, Lafeyette, CO
Direction of camera and distance to cloud:	~30°, ~750’

Introduction:

This is the first assignment from Flow Visualization where we are documenting clouds. We were encouraged for this assignment to document the sky early and often for a period of about 6 weeks. Therefore, unlike other assignments from class with elaborate and extensive setup, there was no empirical process for this project. Over the 6 week period I took a variety of different pictures of clouds, although none were as dramatic or as precise as this one.

Documentation Process:

This image was taken as a consequence of circumstance while I was at **Waneka Lake Park** in Lafayette, CO. Lafayette sits at an elevation of approximately 5,210'. I took this photo on my iPhone X, approximately **750'** below the clouds. Because the clouds sat so low on that day, I pointed the camera at quite a shallow angle, approximately **30°**.[1]

Cloud Characteristics:

I believe the clouds I observed to be a mixture of nimbostratus, stratocumulus, and cumulonimbus. There are several quite clear reasons for this observation. Firstly, the the sky is blanketed in clouds, which would generally mean stratus. However, these clouds were voluminous in nature and quite opaque. I believe these clouds were stratocumulus, as they covered the sky, but did not produce any rain. Next, the cloud found most prominently in the foreground appeared to be a nimbostratus cloud. While very low hanging, dark in nature, and producing quite a bit of rain, this cloud was not producing lightning. Lastly, as the nimbostratus extended farther in the background of the photo on the right side, I believe it showed the qualities of a cumulonimbus. I say this because, while there was no lighting from the cloud over the lake, thunder could be heard not far in the distance (perhaps 3-5 miles away).

Found below, in Figure 1, is the Skew-T diagram produced by the University of Wyoming, from Grand Junction, Colorado. The Skew-T diagram below shows where clouds reasonably could lie based on a set of parameters. For this particular Skew-T, we can estimate the approximate altitude location of the clouds and the wind speed and direction. As an aside, Grand Junction is a little over 250 miles South-Southwest of Lafayette, and east of the Rocky Mountains. Therefore, this analysis will have some inaccuracies built into that locational uncertainty.

The relationship between the two soundings shows the areas of thermodynamic unrest. From approximately 5810m to 8000m there are multiple areas where the air slinkies back and forth rapidly between higher and lower temperatures, with fluctuating densities. That means there are probably a series of unstable cloud formations at this elevation. At 8000m the air parcel cools until it reaches 9500m, when the parcel once again warms indefinitely. There appears to be an apparent volatile cloud formation around 8000m, which stabilizes until around 9500m, at which point a large voluminous plume forms until at least 16500m.

[1] https://www.usgs.gov/us-board-on-geographic-names

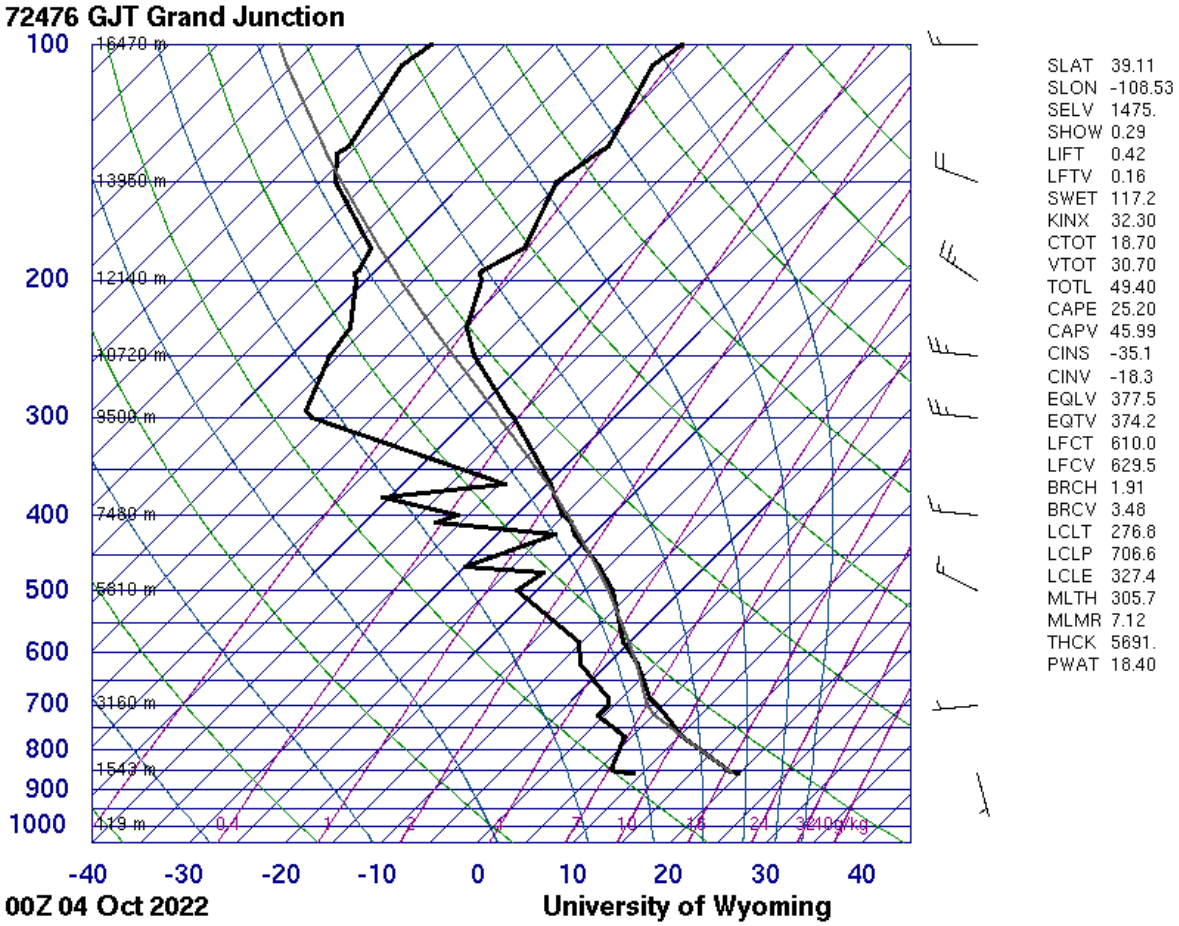

Figure 1: Skew-T diagram from a weather balloon over Grand Junction, Colorado[2]

Camera Settings:

For this assignment I used an iPhone X. For further information concerning the camera settings, lens specs, and experimental procedure see *Table 1* below.

Spec	Description
Camera Type	iPhone X
Field of View	2000’ x 750’
Distance from Object to Lens	~100-1000’
Focal Length	1.54mm
Aperture	f/2.4
ISO	64
Shutter Speed	1/122”

Table 1: Camera settings and lens specs

[2] https://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=GIF%3ASKEWT&YEAR=2022&MONTH=10&FROM=0400&TO=0400&STNM=72476

I shot this photo in Apple's raw HEIC photo format, with an initial and final resolution of 4032 x 3024 pixels. I opted against cropping the photo, as I believed the relationship between the lake and dark cloud above it, as well as the auxiliary clouds, was crucial to the narrative of the photo.

I chose to use Adobe Lightroom as my post-processing tool for this image. I was lucky to be in the right place in the right time, as this image has quite an impressive dynamic range. The contrast between highlights and shadows are so prevalent, that I chose to use Lightroom to enhance the color saturation, instead of the overall brightness/exposure of the image. For this reason, I upped the vibrancy by 5 points, and the saturation by 3 points. This was enough to extract some life out of the clouds and the water beneath it.

Conclusions:

Like the other images I've submitted in Flow Vis, for this assignment I tried to document a type of flow that was as aesthetically pleasing as it is interesting. In addition to showing the formation of a series of different clouds that aggregated to produce a storm, I was able to document an interesting compositional relationship between the lake, sky, and surrounding contextual elements. In terms of improvements, perhaps I could have found a place to shoot that included the wind conditions influencing the clouds. I am satisfied with my documentation of the situation, and fulfilled my intent with the assignment.

Edited photo