

Cloud Report 1 - MCEN 5151

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1 Initial and Final Photos



Figure 1: Unedited Photo



Figure 2: Processed Image

2 Background

This is the first of two Cloud reports for the Flow Visualization class. I sat in Crested Butte, Colorado on the evening of September 18th as the sun set. I awaited the setting sun, looking at the clouds passing above the eastern range of mountains. And there, all at once, the Heideggerian curtains of cloud-based truth showered themselves upon me at the balcony where I stood. In awe, I aimed my mechanical-memory-maker in their direction, and began to shoot! I captured an image which I greatly enjoy, with beautiful reds and pinks leading the frontward charging point of the cloud. Some minor post processing was done to make these colors even stronger, more pronounced, in order to exhibit their full beauty.

3 Geographic Notes

This image was taken in Crested Butte, Colorado. The date was September the 18th, right around 7 in the evening. The direction was East-North-East, at a heading of nearly 285° . Google says that the elevation of Crested Butte is 8,909 feet, and add another 20 for the balcony I was standing on - totalling 8929 feet. I would assume my angle upwards was something near 25° . Now, here is a table that displays all of this information in an accessible manner (realistically though, it is just to lengthen the report overall).

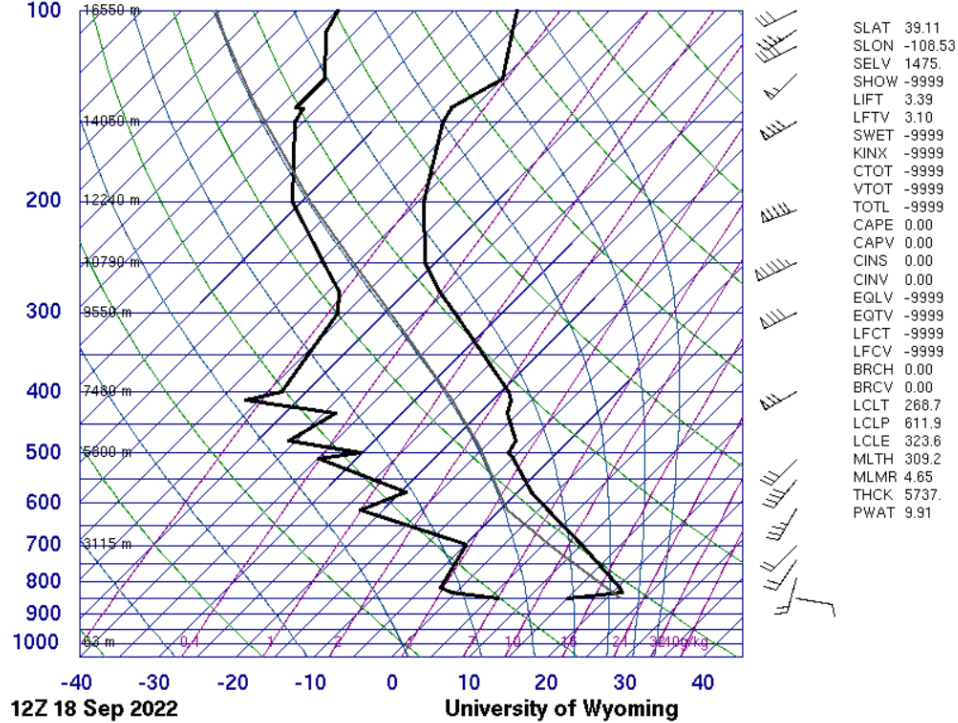
Location	Crested Butte, Colorado
Heading	285 Degrees (Notionally)
Elevation	$8909+20=8929$ feet
Angle above horizontal	Vaguely close to 25 degrees

Figure 3: The Most Useful Table in Kosovo

4 Cloud Analysis

The clouds pictured are likely of the Stratocumulus variety. These clouds were relatively low in the atmosphere, and exhibit shapes that match up well with what would be a Stratocumulus cloud. The winds were largely in the prominent direction, which was an eastward heading over the mountain range. The weather was mostly clear, and the temperature was nearly 60 degrees Fahrenheit on the ground. There were no fronts coming through at the time, and there was no precipitation that day. Based on the Skew-T diagram, these clouds seemed to sit higher than might be originally expected by the normal definition, but there might have been some lift-effect as they passed over the mountains to the east. The clouds are estimated to be nearly 3000 meters above the ground, which is higher than would be expected. Here is the Skew-T below:

72476 GJT Grand Junction



5 Photograph Parameters

The basic specifications and camera settings are listed in the table below. The shutter sensitivity was relatively low due to the limits of old technology (my crusty camera).

Camera Setting	Value
Aperture	f/3.5
Exposure Time (s)	1/400 = .0025
ISO	3000
Raw Resolution (Width x Height)	6000 x 4000
Camera/Lens Model	Canon Rebel T1i, Sigma 18-250mm f/6.5
Distance From Object to Lens (m)	A ways
Lens Focal Length (mm)	250mm

Some basic calculation can be done to calculate the field of view of the camera. The 35mm equivalent of the Canon T1i can be calculated knowing the focal length, sensor size, and aperture used. The 35mm focal equivalent of the Canon at that focal length was 400mm. The sensor on the Canon Rebel T1i has dimensions of 22.3 x 14.9mm, with a sensor diagonal width of nearly 26.8mm. Knowing this information, the horizontal angle of view can be calculated even though there is no direct way to determine a length-scale from information in the image.

$$\text{Horizontal Angle of View} = 2 \arctan\left(\frac{\text{Sensor Size}}{2 \cdot \text{Focal Length}}\right) = 3.84^\circ$$

Knowing this angle, coupled with the distance from the camera to the plane of focus ($d = 20.000 \text{ m}$), the field of view can be calculated as well:

$$\text{Horizontal Field of View} = 2 \tan\left(\frac{\text{Horizontal Angle of View}}{2}\right) \times d \approx 1500 \text{ m}$$

In terms of image processing, not much work needed to be done to the image. To account for the lack of illumination, there was high exposure and a high ISO. In post processing, the sharpness of the image was increased in order to reduce the graininess induced by the high sensor sensitivity. The brightness was also increased in tandem with minor adjustments on each RGB Curve. The image was also cropped to more clearly emphasize the subject. Minor white and black-point adjustments were made in order to create clear contrast between the smoke and the background.

6 Intended Image Ideals, and the Inevitable Shortcomings

I think this image came out quite well. The experiment itself went smoothly, and only adjustments to the image settings were necessary. I think the subject of the image is interesting, and the general shapes and color palette is enjoyable. The orange billows out on the center of the image I find quite encapsulating, and something I enjoy staring at. There are some issues I would have liked to fix with the image, though. First, the image is not incredibly well focused as the manual focusing ring was too difficult to turn for my dainty fingers. It would have been beneficial to spend more time making minute adjustments to the focus. For the duration of the image-taking, the light quality made it difficult to inspect the photos on the screen of the camera, thus it was difficult to tell if the focus was in the desired location. In terms of post processing, I tried to do work to largely denoise the image. I think I did a decent job of this, though it was difficult to bring a "crispness" (similar to a fresh McDonalds fry) to the image that I like. Overall I am quite happy with this photo, the different billows of the cloud are beautiful.