2021 Fall - Image First Report

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MCEN 4151-001
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A. Context and Purpose

The purpose for this image was to capture the beautiful and intense cloud patterns shown in Figure 1. When driving home from Aspen, Co one weekend, I found myself observing the clouds over the mountains. Coming to a place where there was an opening, I got out and took a handful of photos. There was a nearby lake, which reflected the clouds, as well as peaks which gave a very pretty horizon underneath.

Figure 1. *Final Photo, showing the cloud formation above Independence Pass, Co*

B. Settings of Image

I took this photo on Independence Pass, Co, which is right between Aspen and Leadville CO. The elevation of the pass is 12,095 ft. I took the photos on 19 September, 2021 at 5:00 pm. Google Earth Pro was used to determine the direction and elevation angle of my photo: It was taken facing 225° SW, with an elevation angle roughly 15° above the horizon.

C. Analysis of Weather

The clouds pictured are a mixture of cumulus and stratocumulus clouds. This was determined using research and comparison methods. The Skew-T diagrams help us understand altitude and environment factors that affect and predict cloud formation. Since I took my photo on

19 September at 5:00 pm, the best time to gather the Skew-T diagram would be from 00Z on 20 September. However, this data was not available from either Denver or Grand Junction (Independence pass is about halfway between the two stations as the crow flies). This could explain why the photo is not exactly indicative of the photos taken. In the Skew-T, we observe the black lines are closest together between 3100 m to 5630 m. By using the elevation at Grand Junction (4583') and the elevation of the photo (12,095'), the Skew-T predicts clouds formation at an estimated 6,700'. This is very close to the my own estimated height of 6,000'. It also supports the assumption that these clouds are a mixture of cumulus and stratocumulus clouds, since they are characteristically found at a low altitude, around 6,500' above the ground level [3].

Additionally, the Skew-T CAPE value is helpful for understanding the environment in which these clouds are forming. CAPE is an acronym for convective available potential energy. Since our CAPE value is 9.57, that indicates a positive cape. Larger values, in the 1000s indicated large or extreme potentials. This small positive cape describes a weather system that is developing slowly and is very predictable. This matches the weather during that day in aspen, where the clouds and weather developed calmly and gradually as the day progressed to evening.

Finally, to discuss some other conditions of the weather, it is important to note that these clouds did not produce any rain within a few hours of when the photos were taken. The atmospheric stability (based on the CAPE number) was very stable and not erratic. These conditions lead to the successful capture of the photo in Figure 1.

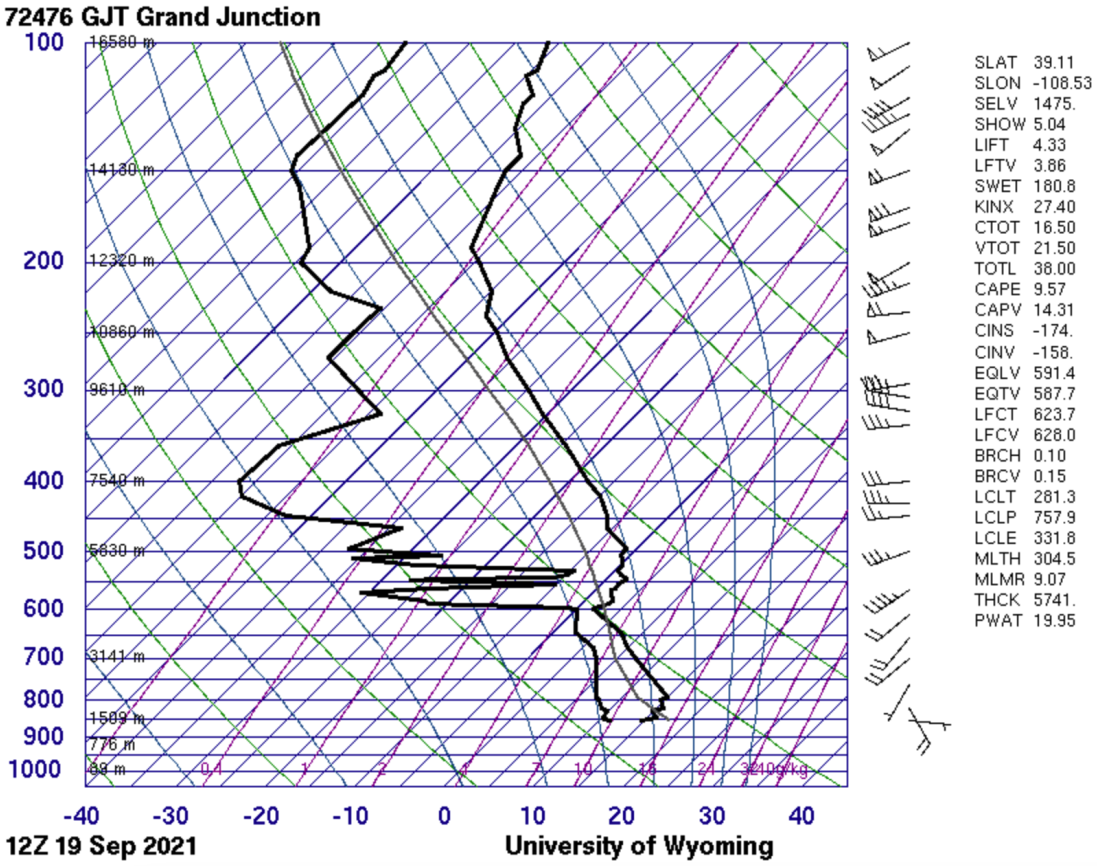


Figure 2. *Skew-T diagram from time of photo. This Diagram was Created from Grand Junction at 12:00 on the day of my photo[1].*

D. Photographic Technique

These photos, unfortunately, were captured with my iPhone 7. While a nicer camera would have been able to more fully capture the serene clouds above independence pass, since it was all I had, it was definitely rewarding to take some photos. For my final photo, the following specifications were recorded [2]:

Camera: Apple iPhone 7 back camera 3.99mm f/1.8
Field View: Unknown
Distance from object: 6000 ft
Size: 4032 x 3024
File Size: 872 KB
ISO: 20
F: f/1.8
SS: 1/4367 s

These settings did a good job taking getting the best focus and lighting effects for the photo. However, a camera with more versatility and better quality would have gotten a clearer and more aesthetically pleasing photo. For an older iPhone, it captured the scene well, and a bit of post processing helped a lot [4]. Figure 3 shows the original and post processed photos.

Figure 3. *The original photo is shown on the right, and the post processed image is on the left.*

When post processing, the key focus was to bring the colors and brightness out so that the photo is not as dark. In the original photo, the land is very dark, while in the post processed photo, the land has some color and the sky is also brightened. While I think it would have looked a bit better with the land more fully visible, it does draw attention to the clouds.

E. Image Commentary

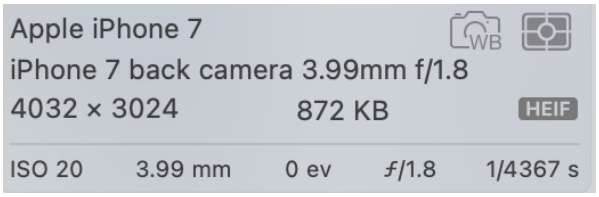
I really enjoyed getting to take this photo. It was such a beautiful landscape and I normally would not stop to take a picture. Because of the assignment, I stopped at the top of

Independence pass and collected these and other pretty shots. My favorite aspect of the photo is the fence, which looks like it is reflecting the light of the clouds. While the main focus is the clouds, the fence provides a point of interest that draws the landscape and the sky together.

F. Appendix and References

[1] Skew-T diagram generated from this website (http://weather.uwyo.edu/upperair/sounding.html).

[2] Photography specifications for the final photo:



[3] Information about cloud types and their altitudes was gathered from this website (https://mediawiki.ivao.aero/index.php?title=Types_of_clouds) and from class notes.

[4] photo processing