Patrick Watson

Clouds First

MCEN 4151

10/30/23

Flat Iron Clouds

October 3, 2023 11:00 AM

Purpose

This photo's purpose is to provide visually pleasing surroundings to accompany some very beautiful clouds. The intent of this photo is to show as many different cloud types as possible and to help the reader (and writer) learn more about this system of clouds. This photo was curated from a wide range of photos taken over a few months due to its complexity and clarity. The photo provides at least three different types of cloud systems as well as some rain in the background. The photo was edited minimally to preserve the details and maximize quality.

Context

Planning for the photo took place the night before to maximize timing of clouds and ideal hike time to take the best photo of the clouds. The 1st/2nd Flatiron hike was ideal for taking photos of clouds because it provides an overlook of the Rockies and the great planes. Often days when it is clear, Denver provides a scale for the viewer to see how far away the clouds are. Hiking time was around 50 minutes from the Chautauqua trailhead to the saddle between the 1st and 2nd Flat Iron. Hiking distance from the trailhead is around 1 mile and 1200 feet of elevation gain. The overall elevation near the saddle is 7100 feet above sea level. The photo was taken facing South at 11:00 AM on October 3, 2023. The photo was taken with the horizon in the middle of the photo and then edited to make the horizon on the lower 1/3rd of the photo.

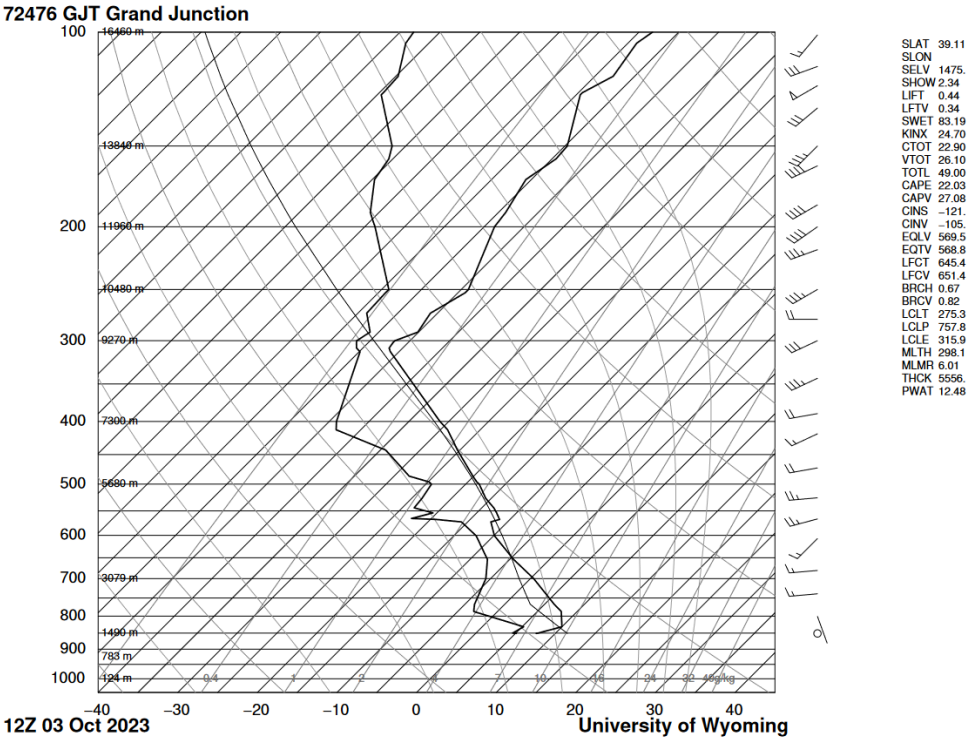

Figure 1: Skew-T Plot for October 3rd, 2023 12:00 GMT

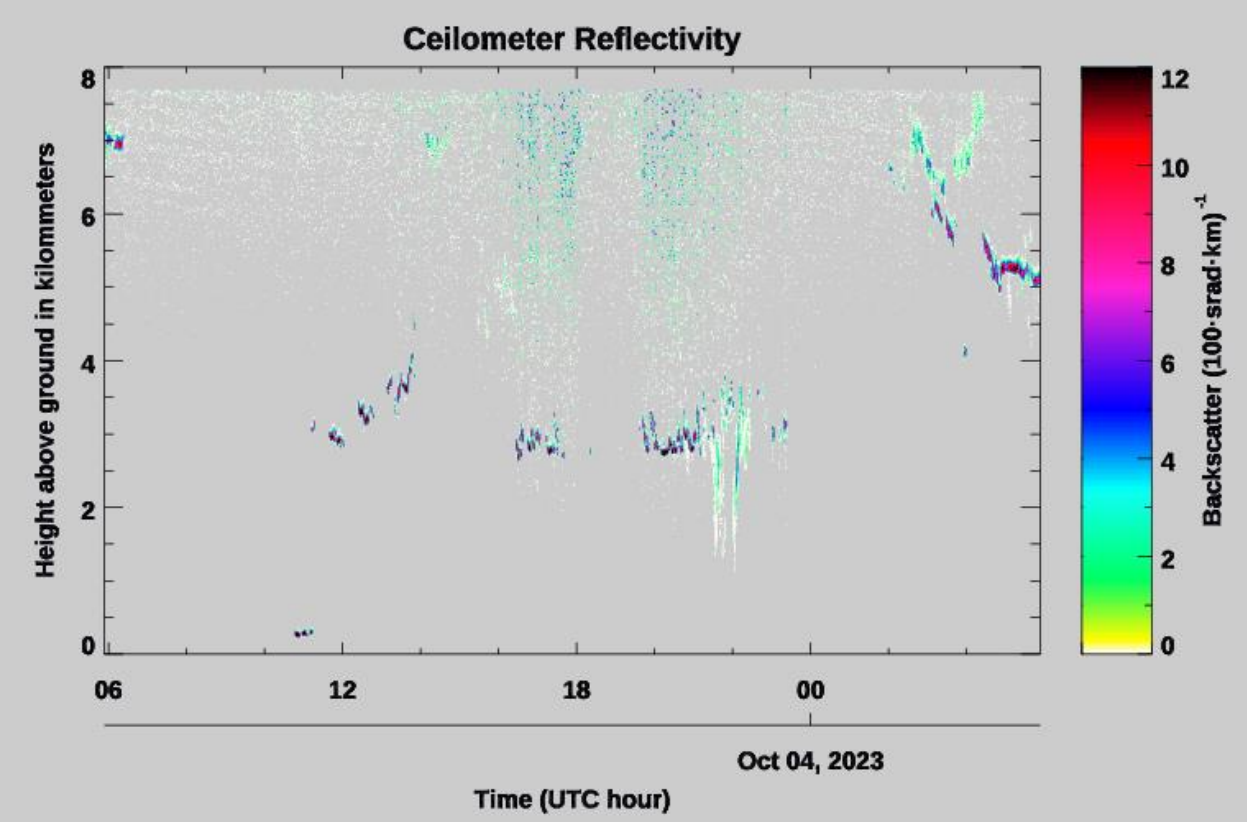

Figure 2: Ceilometer Reflectivity Data from Oct 3rd, 2023 around Boulder, CO

Cloud Description

The temperature high of the day was 68 degrees Fahrenheit, with a low of 45 degrees Fahrenheit in the morning. In the photo there appears to be two or three major altitudes of where clouds have formed. The highest cloud seems to be in the far-right middle of the frame. The second highest cloud appears to be in the upper half of the frame. The lowest clouds in the frame appear to be towards the left and the middle bottom. The most prevalent cloud type in the photo is the Cumulus cloud. This is evident by the relatively low altitude, with respect to other clouds in frame, and the dark shaded area under the clouds. The Cumulus cloud appears to take up four major areas of the frame, one in the upper left quadrant (roughly 1 mile based on proximity to flatirons and NCAR), one in the middle left (Roughly 3-4 miles away based on shadow/time of day and roads), one in the middle center, and one in the middle right peaking around the 3rd Flatiron. The top right of the frame appears to be an altostratus cloud with some altocumulus to the left. The altostratus clouds appear thinned or more transparent while the altocumulus look like they are blobs at roughly the same altitude. The altocumulus, in comparison to cumulus clouds, appears lighter on the bottom which is the reason why I think the clouds just left of the altostratus are altocumulus. In the far frame, just left of where Denver is peaking through the fog, appears to be nimbostratus (roughly 5-6 miles away based on the distance from the lake in view) and looks to be lightly raining by the dark striations below the cloud. Off to the right, by the tip

of the third Flatiron, appears to be a cirrostratus telling by the altitude and the thin appearance of the cloud. Many of these clouds were checked with our industry expert at NCAR, Dr. Tian. The Skew-T plot for the day of the photo appears to corroborate the theory of three major altitudes of clouds around 2100m, 5030m, and 7000m above ground. The available Ceilometer Reflectivity data for October 3rd, 2023, appears to have picked up a cloud layer around 3000m above ground. But telling the sparseness of the clouds, might not have measured the other clouds. The nature of Ceilometer Reflectivity measurements (Ceilometers use Light Detection and Ranging) are directional.

Imaging

The photo was taken on an iPhone 14 Pro using the automatic features with the raw function enabled. Image settings are in Table 1.

Camera	iPhone 14 Pro
Focal Length	24mm
ISO	80
Exposure Value	0
Aperture	f/1.78
“Shutter Speed”	1/13699 seconds
Image Size (Pixels)	4032 x 3024

Table 1: Camera Specs

Per Apple, the iPhone 14 Pro has a field of view of 120 degrees. This allowed me to capture all the clouds within the frame. This photo was inspired by the hundreds of other photos that I have taken at this location. I knew exactly where to go to be able to get a perfect picture of the clouds. I was able to look back on previous photos to be able to know where to focus and how to maximize the view. Very little alterations were made to the photo. This was thanks to the very nice camera on the iPhone 14 Pro being able to capture HDR photos natively. The Camera can utilize the range of colors available and makes my life easier such that I have to do very little editing. On an OLED 10-bit color monitor or on the iPhone the cloud edges pop a lot and really bring the photo to life. I felt that any RGB curve optimization in Photoshop would have meant a loss in detail with blown out whites or dulled blacks. The only alterations that were made were to the sizing of the image. Because there are trees surrounding the frame, I decided to center the photo on the horizon. As suggested by my colleagues (classmates) I decided to follow the rule of thirds and crop the photo such that the horizon fell on the lower third line of the image. This put better emphasis on the clouds in the photo rather than the Flatirons in the foreground. Thank you, colleagues, for the suggestion!

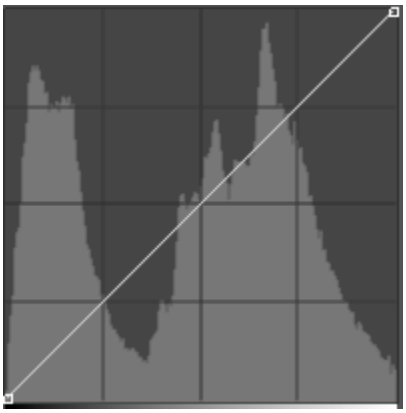

Figure 3: Photoshop Unaltered RGB Curve

Figure 4: Edited (Top) vs Unedited Photo (Bottom)

Conclusion

I loved everything about the photo. I was on my favorite hike and got lucky with how many clouds I was able to frame. I really enjoyed my time looking at clouds. I enjoyed looking up towards the sky while I walked to and from classes to try and top this image. I feel this image fully shows what we have been learning in Flow Visualization.

References

Hertzberg, Jean. "Clouds 3: Skew - t and Instability." *Flow Visualization*, 10 Aug. 2023, www.flowvis.org/Flow%20Vis%20Guide/clouds-3-skew-t/.

Education, UCAR Center for Science. "Center for Science Education." *Cloud Types | Center for Science Education*, scied.ucar.edu/learning-zone/clouds/cloud-types. Accessed 30 Oct. 2023.

Skywatch Observatory, skywatch.colorado.edu/. Accessed 30 Oct. 2023.

Atmospheric Soundings, weather.uwyo.edu/upperair/sounding.html. Accessed 30 Oct. 2023.