Clouds First - Fall 2025

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MCEN 5151-001

October 19, 2025

Purpose and Context

The intent behind this image was to capture an interesting cloud phenomenon appearing in the sky, analyze the stability of the clouds within the image, and decipher what could have caused the phenomenon at hand. The image that I ended up capturing was the beginning of a thunderstorm over Erie, Colorado, and provided a great amount of depth that can be seen with the turbulence in the sky. I found this image to be very interesting and showcased a cloud formation that inline with the unsteady atmosphere that is often seen during Colorado summers.

Location Details

Location	Erie, Colorado (southeast of Longmont) along a farm field
Camera Direction	Northwest
Elevation Angle	Zero degrees
Date and Time	October 4, 2025 6:39 PM

Cloud Physics

The main cloud formations appearing in this photo are stratocumulus (developing toward the right-hand side) and nimbostratus clouds (toward the right-hand side, closer to where the actual rain is occurring in the photo). Stratocumulus clouds are characterized by their low-level appearance and often "appear as a lumpy cloud layer" [3]. On the other hand, nimbostratus clouds bring forth the vast amount of rain that falls to the earth and are typically considered the thicketest clouds [1]. The difference between the two can be categorized by their associated weather patterns: "Stratocumulus clouds often result in a light drizzle, while Nimbostratus clouds bring forth heavy rainfall accompanied by thunder and hail" [2]. The storm that was developing in this image likely points to the presence of both storm and rain clouds, hinting that these are the two main cloud formations that are present.

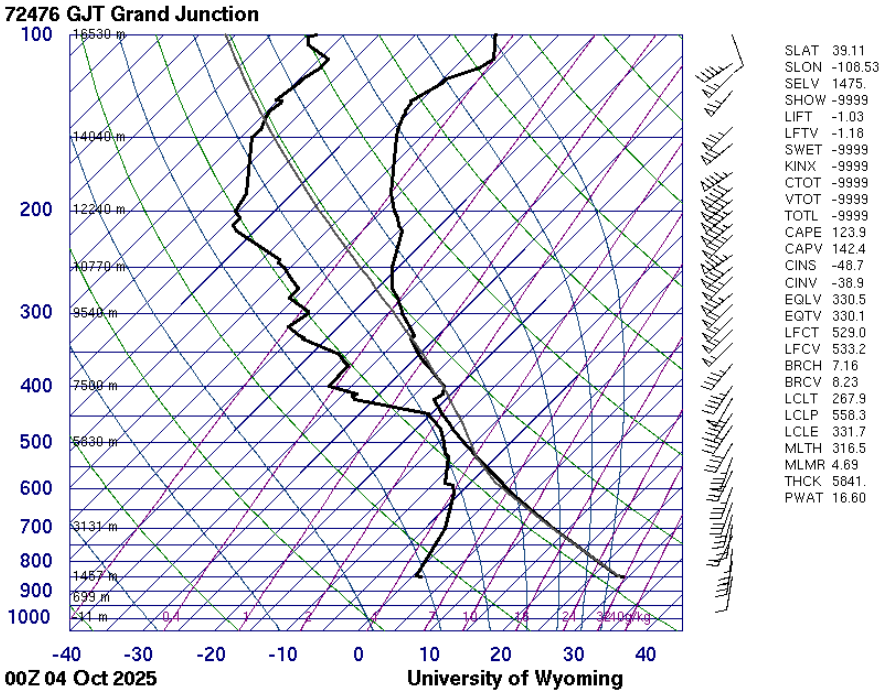

Figure 1: Skew-T Diagram

The Skew-T diagram (above) was generated for 6:00 PM on October 4th near Grand Junction, Colorado. This location was the closest atmospheric data center to when and where the photo was taken. This leads to some discrepancy with the actual cloud phenomenon and the associated data, but similar patterns are observed, proving that the data does capture the relative weather patterns even though the location is fairly far away.

The plot shown above shows that there is a slightly unstable atmosphere, as indicated by the CAPE (Convective Available Convective Energy) value of 123.9. According to NOAA, "A higher value of CAPE means the atmosphere is more unstable and would therefore produce a stronger updraft" [6]. Given this association, it can be concluded that these clouds were formed in a mildly-unstable atmosphere, supported by the darker shades seen in the clouds. Taking another look at the plot, it can be seen that clouds are likely to form around an altitude of 6600 meters. In general, this is where stratocumulus clouds tend to form, aiding in the conclusion that there are several of these clouds in the image. These clouds often form anywhere between 6500 and 23000 meters, clearly demonstrating the fact that there are also nimbostratus clouds present.

Visualization Techniques

The final image was captured on an iPhone 16 Plus with a 24mm equivalent lens. The following table presents the exact properties of the final image.

Camera Settings	**Value of Settings**
Focal length	6 mm
Aperture	f/1.6
Shutter Speed	1/122 s
ISO	50
Size	5712×4284 pixels

Figure 2: Image Properties

The field of view for this image, with the associated camera specs, is 143.36 degrees horizontally and 127.126 degrees vertically. A few edits were made for this image, specifically related to the cropping techniques and RGB enhancement. The image was cropped from its original size (shown below) to maintain focus on the cloud formation at hand rather than the farmland in the background. I also adjusted the RGB curve to maintain more of an "S-shape" to increase the

deep shadows from the increased moisture in the clouds and the highlights were slightly increased to emphasize the drama within the photo.

Original Image	**Final Image**
	
5712×4284 pixels	1300×741 pixels

Figure 3: Original and Edited images

Conclusion

The final image, as shown above, captures the stunning beauty of a developing stormfront. I find the most appealing aspect of the image to be depth that is solely captured by the color contrast within the cloud formations. I am very satisfied with the color adjustments and cropping choices I made with this image, though I would like to include more of the cropped landscape to enhance the midwest, storm-chasing effect. I would have also liked to try to take an image with my Canon Rebel XS, though I didn't have access to a more advanced camera at the time the photo was taken. Overall, I really enjoy the final edits I decided to make and the atmospheric conditions that were captured.

References

[1] *The Four Core Types of Clouds | National Oceanic and Atmospheric Administration*, www.noaa.gov/jetstream/clouds/four-core-types-of-clouds. Accessed 20 Oct. 2025.

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[3] Matheou, Georgios, et al. “Large-eddy simulation of a stratocumulus cloud.” *Physical Review Fluids*, vol. 2, no. 9, 29 Sept. 2017, https://doi.org/10.1103/physrevfluids.2.090509.

[4] *Stratocumulus Clouds in: Monthly Weather Review Volume 140 Issue 8 (2012)*, journals.ametsoc.org/view/journals/mwre/140/8/mwr-d-11-00121.1.xml. Accessed 20 Oct. 2025.

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[7] “Www.Scantips.Com.” *Camera Field of View Details and Calculator (FoV)*, www.scantips.com/lights/fieldofview.html#top2. Accessed 28 Sept. 2025.