

Fall 2021 – Cloud First Report

MCEN 5151-001

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Introduction:

The purpose for this image was to capture different types of clouds layered on top of one another. Some clouds in the image shown on the cover page appear to be closer than other clouds and look to be different clouds as well. The clouds are also covering the sun in the top left corner of the photo which shows the different layer of clouds in the sky.

Image Circumstances:

This image was taken at the end of a hike in Estes Park, Colorado near Rocky Mountain National Park on September 11, 2021, at 3:23 PM. The direction this photo was taken was roughly west with an approximate 35-degree angle from horizontal. The elevation was also around 2,600 meters.

Cloud Data and Information:

The types of clouds shown looked to be altocumulus and cumulus clouds based on the skew-T diagram (Figure 1), lecture notes, and the image shown on the International virtual Aviation Organization website [3]. These clouds were only apparent west of the location while the East had little to no clouds. The clouds the day before were very different because it was raining the night before, so more clouds were prevalent, and the sky was a lot darker. In terms of wind, there was a lot of wind near our campsite, however, while hiking and at the top of the hike there was little to no traces of wind. Based on the skew-T diagram shown below in figure 1, it can be concluded that the atmosphere was stable because the CAPE value was 0.00. The CAPE value is a “surface based Convective Available Potential Energy measurement.” [4] A CAPE of 3000 to 4000 J/Kg or higher indicates an atmosphere that could produce severe weather storms. Based on this, cloud types that could be expected are cumulus clouds and cirrus clouds which somewhat agrees with my initial observation. At first, I thought the higher clouds were altocumulus clouds, but after reviewing the skew-T diagram and reviewing the photo with my classmates, it can be confirmed that those clouds are cirrus clouds. In the skew-T diagram, the lines are closest at around 6000 meters and 10,000 meters which indicates that this is the elevation of the clouds. This would make sense that the clouds are cumulus clouds and cirrus clouds because cumulus clouds can be found at 6000 meters and cirrus clouds can be found at 10,000 meters.

72469 DNR Denver

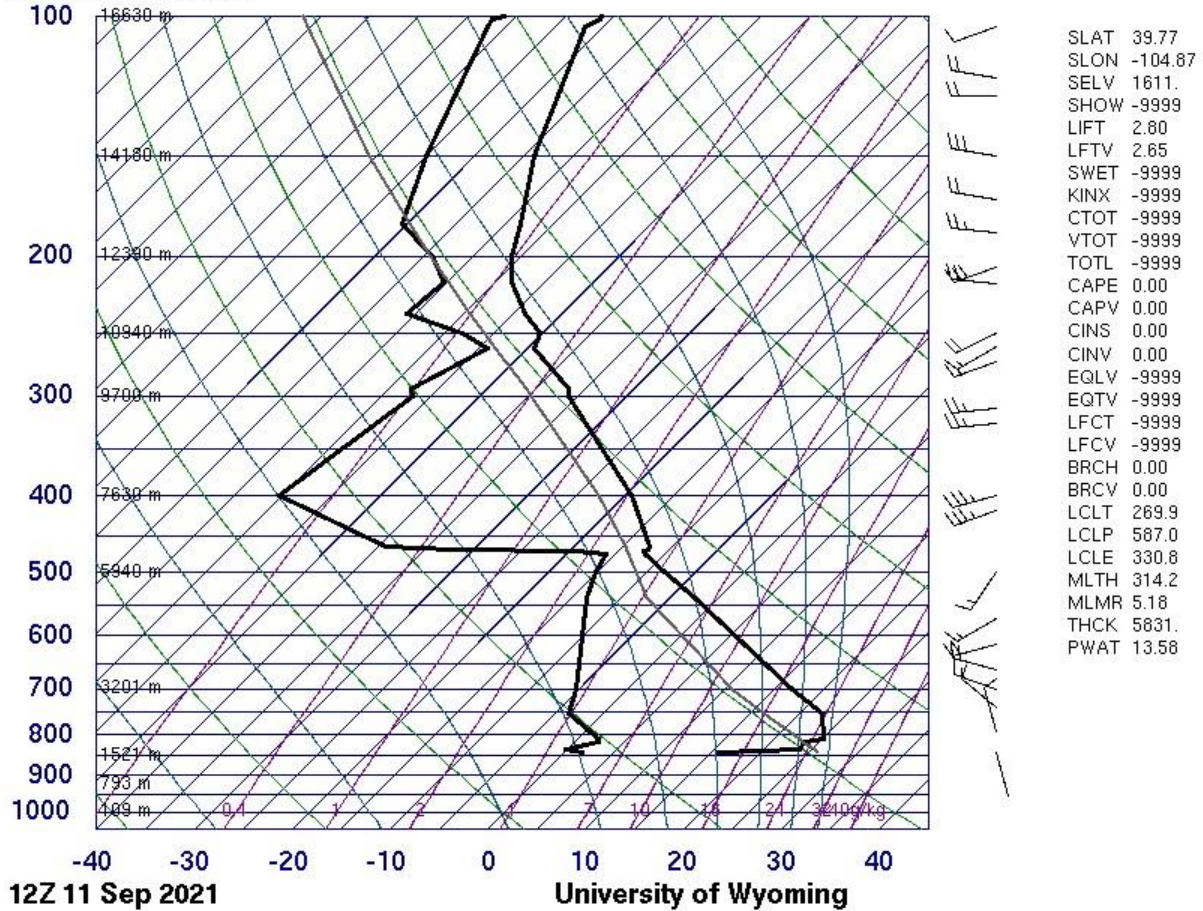


Figure 1: Skew-T Diagram from Denver at 12:00 on September 11, 2021

For the physics of these clouds, cirrus clouds “form from the ascent of dry air, making the small quantity of water vapor in the air undergo deposition into ice.” [1] With that being said, cirrus clouds are completely made up of ice crystals which gives them their white color and different shapes. Unnaturally, cirrus clouds can also occur from contrails from planes. For cumulus clouds, they are formed because “as air heated at the surface is lifted, it cools, and water vapor condenses to produce the cloud.” [2] This is also known as convection.

Photographic Technique

For the first clouds photo, the image was taken on a Samsung Galaxy S9 while holding the phone with my hands and manually pointing the camera towards the sky. Although a better camera and a tripod would have been nice and able to capture a more stable and clearer photo, the Galaxy did a fine job for taking a quick snapshot during a hike. The settings of the camera were as followed:

Camera: Samsung Galaxy S9
Aperture: f/2.4
Exposure: 1/6274s
Focal Length: 4.30 mm
ISO: 50
Width: 4032 pixels
Height: 3024 pixels

Again, based on the skew-T diagram, it can be seen that the cumulus cloud was roughly 3400 meters away from the camera lens while the cirrus cloud was roughly 7400 meters away. Very minor post-processing was done on the photo. The photo was sharpened to the settings shown in figure 2.

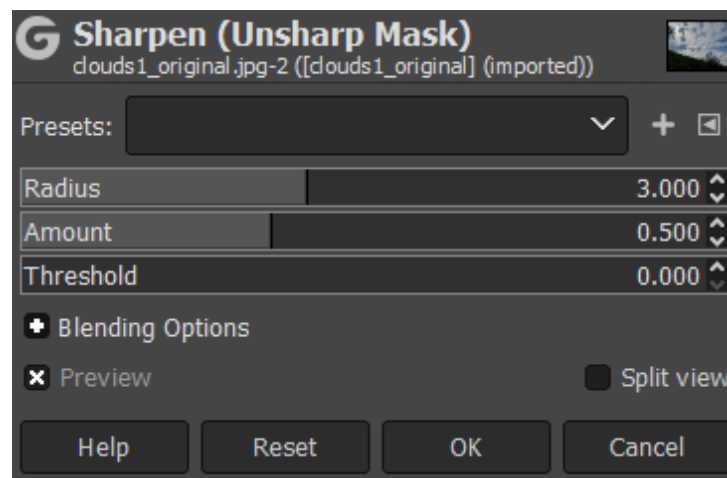


Figure 2: Gimp Sharpen Settings

The main goal for sharpening the image was to hopefully see the different layer of clouds in the image. Sharpening the closer cumulus clouds would make them a little more distinct from the further cirrus clouds.

Conclusion:

The image reveals the unique combination of cumulus clouds layered in front of cirrus clouds. What I like about the image is the depth between the clouds. It is clear how much closer the cumulus clouds are on the left side of the picture than the cirrus clouds are. What I did not like about the image was the trees at the bottom of the photo. If I were to develop this photo further, I would experiment ways to make the trees less visible so that more of the focus could be on the clouds. Overall, I believe I fulfilled my intent with this image.

References

- [1] Cirrus clouds. (n.d.). Retrieved from <https://www.metoffice.gov.uk/weather/learn-about/weather/types-of-weather/clouds/high-clouds/cirrus>
- [2] Cumulus clouds. (n.d.). Retrieved from <https://www.metoffice.gov.uk/weather/learn-about/weather/types-of-weather/clouds/low-level-clouds/cumulus>
- [3] Types of clouds [PDF]. (n.d.). Retrieved from https://mediawiki.ivao.aero/index.php?title=Types_of_clouds
- [4] US Department of Commerce, N. (2017, June 01). Convective Parameters - Cape. Retrieved from <https://www.weather.gov/fwd/convectiveparameterscape>

Appendix



Figure 3: Unedited Image