

Fall 2021 – Cloud Second Report

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Introduction:

The purpose for this image was to capture different types of clouds layered on top of one another during a sunrise to give the clouds a unique yellow and red color. 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 also do not completely cover the blue sky to give the image some contrast. Some clouds even appear to be a mix between the blue and red colors as they are in between other clouds and the sky.

Image Circumstances:

This image was taken in a condominium parking lot in Boulder, Colorado just a couple minutes east of CU on October 25, 2021, at 7:09 AM. The direction this photo was taken was roughly east with an approximate 50-degree angle from horizontal. The elevation was also around 1600 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 East of the location. Although there were some clouds west, they did not have the same color as these clouds. A couple minutes after taking this photo, the sun rose more to the point that these clouds no longer had the yellow and red color and appeared with a more normal white and gray color. In terms of wind, there was little to no 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 altocumulus clouds which agrees with my initial observation. The closest and most noticeable cloud in the photo appears puffier and more vertically developed than the clouds around it which had me speculating that it was a cumulus cloud. In the skew-T diagram, the lines are closest at around 1540 meters and 6000 meters which indicates that this is the elevation of the clouds. This would make sense that the clouds are cumulus clouds and altocumulus clouds because cumulus clouds can be found at 1540 meters and altocumulus clouds can be found at 6000 meters.

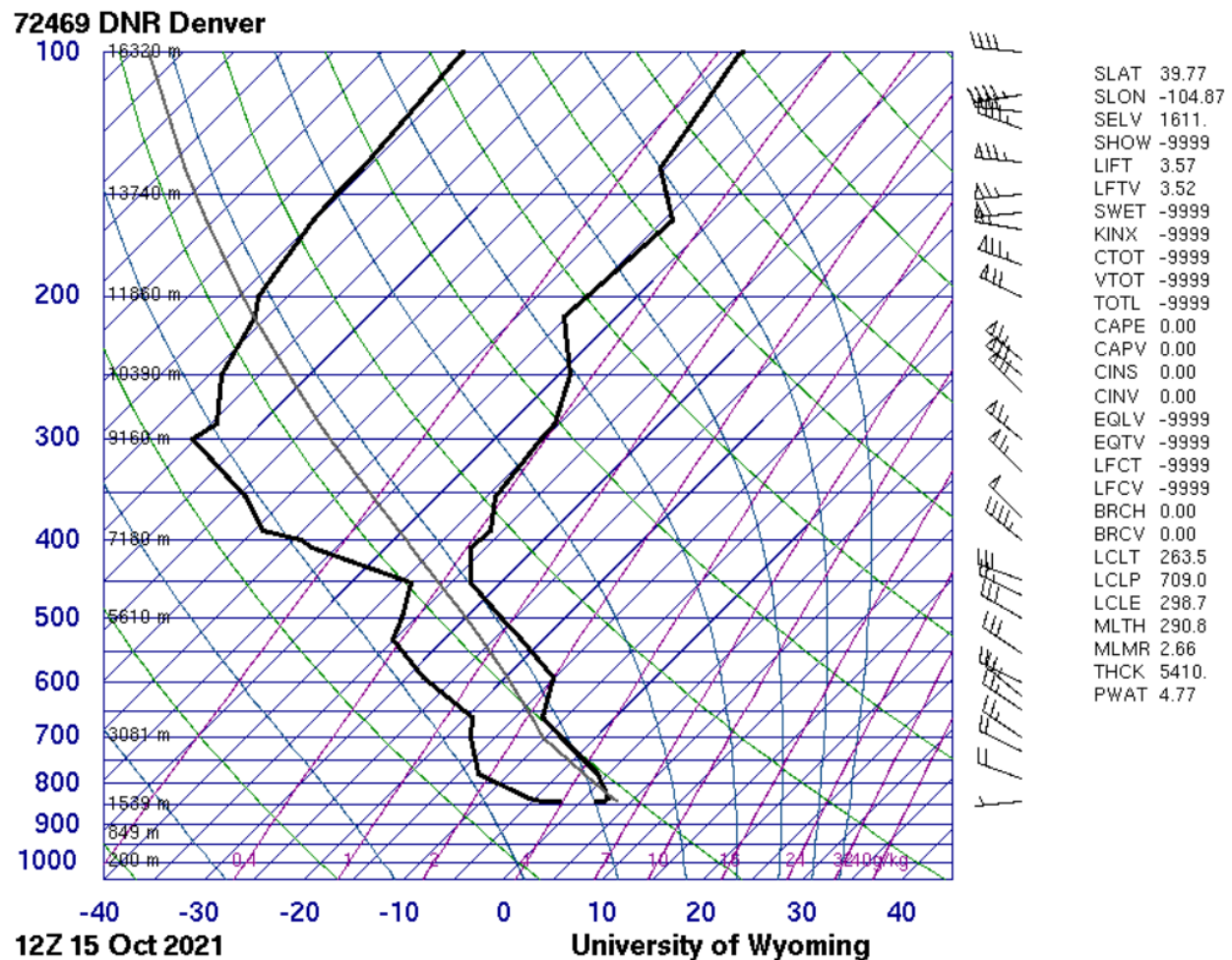


Figure 1: Skew-T Diagram from Denver at 6 am on October 15, 2021

For the physics of these clouds, altocumulus clouds give off a more delicate appearance than cumulus clouds which are bigger and fluffier. This is due to the ice and water mixture within the altocumulus clouds. A way these clouds are formed are from “mountainous terrain producing atmospheric waves.” [1] 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 second 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 before heading to work early in the morning. The settings of the camera were as followed:

Camera:	Samsung Galaxy S9
Aperture:	f/2.4
Exposure:	1/60s
Focal Length:	4.30 mm
ISO:	250
Width:	4032 pixels
Height:	3024 pixels

Again, based on the skew-T diagram, the cumulus cloud was roughly 1540 meters away from the camera lens while the cirrus cloud was roughly 6000 meters away. Very minor post-processing was done on the photo. The photo was simply cropped to block out buildings, cars, and light posts in the parking lot. Cropping the photo this way helped put the main focus on the clouds (specifically the cumulus cloud) and prevented any distractions from overpowering the color and shape of the clouds in the sky.

Conclusion:

The image reveals the unique combination of a cumulus cloud layered in front of altocumulus clouds. What I like about the image is the beautiful and unique color. It is clear how distinct the cumulus and altocumulus clouds are from shadow and shading given from the sun. What I did not like about the image was how much I needed to crop. If I were to develop this photo further, I would experiment ways to keep the whole photo while just making the clouds the center of attention with shading and blur effects instead of just cropping.

References

- [1] Altocumulus clouds. (n.d.). Retrieved from <https://www.metoffice.gov.uk/weather/learn-about/weather/types-of-weather/clouds/mid-level-clouds/altocumulus>
- [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://mediawiki.ivao.aero/index.php?title=Types_of_clouds

Appendix



Figure 3: Unedited Image