

Seth Dry – Clouds First Report

MCEN 5151 October 20th, 2025



Figure 1 – Final Image

I captured the image shown above for my “Clouds First” assignment. During the course of working on this assignment I was mainly focused on aesthetics. I was taking pictures of clouds that I thought looked visually appealing as I saw them to have a range of images to choose from for my final image. I was fortunate enough to have gone on a flight during this time and captured the image seen in figure 1. This image met my intention of capturing an aesthetically compelling formation of clouds and also captured an informative visualization of these clouds. Being above the clouds gives an interesting new perspective and I think provides some additional insight into the underlying physics.

This image was taken from a commercial plane on a flight from Denver, Colorado to Tulsa, Oklahoma. The plane was above Haswell, Colorado when the picture was taken. The camera is facing south and looking out at an angle about 30 degrees below what I perceived to be level. The image was taken on September 17th, 2025, at 10:41am.

The main formation of clouds shown appear to be altocumulus undulatus. The skew-T plot from the nearest station, DDC Dodge City, is shown in figure 2 below. We can see from the plot that the atmosphere is mostly stable, except for a small region of instability between 550 and 600 hPa. We can also see that the LCLP is 868 hPa, which corresponds to an altitude of ~2000

m. Altocumulus undulatus typically form with some instability, and often before precipitation occurs [2]. Looking at historic weather data, there was mild rain in the evening that this image was taken. As well, if we take the altitude of the plane to be about 30,00 ft or about 9000 m, the clouds could very well be at an altitude of about 6000 m where there is some instability as shown in the skew-T plot. Looking at the available atmospheric data and available references of other altocumulus undulatus clouds, I believe that this is the correct identification.

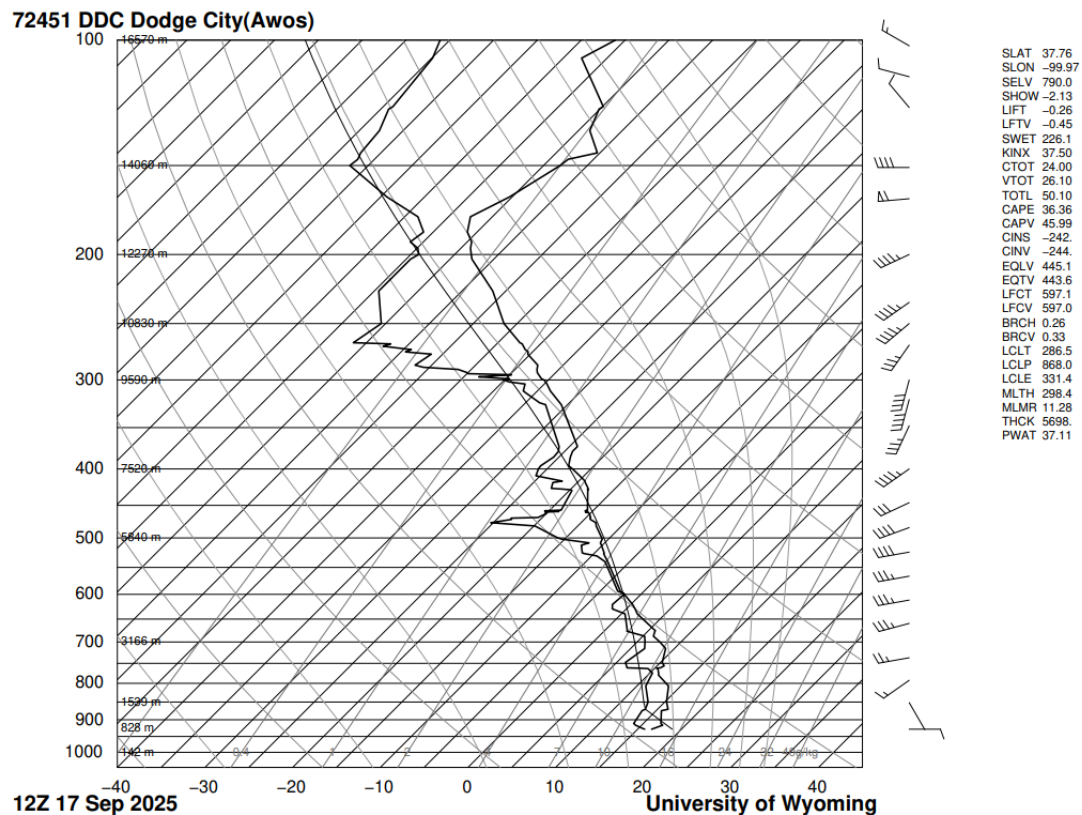


Figure 2 – Skew-T plot

This image was taken using an iPhone 14 Pro Max. The picture was taken with the main camera, which has a 24mm lens and a fixed aperture of $f1.78$. The shutter speed was $1/5848$ s and the ISO was set at 80. The size of the original image was 3024x4032 px, and the size of the cropped image is 3016 x 1885 px. To calculate an approximate FOV we can look at the number of fields seen in the picture. Knowing that land in this part of the US is apportioned according to the public land survey system [1], and assuming the smaller circular fields lie on a quarter section, we can take the diameter of these to be $\frac{1}{2}$ of a mile, and the diameter of the larger circles to be 1 mile. Using pixel measurement software, we can then calculate the FOV through the middle of the image to be about 22 miles. Using this information along with the lens info, we can calculate the center of the cloud formation is about 19 miles away from the camera. The original image is shown below in figure 3. This image was cropped, and the exposure adjusted using the

RGB curves tool in dark table to lower the exposure of the background and heighten the exposure of the darker parts of the clouds. This served to create contrast between the clouds and the background, as well as to make the image more monochromatic, both of which were aimed at bringing the clouds to be the main focus of the final image.

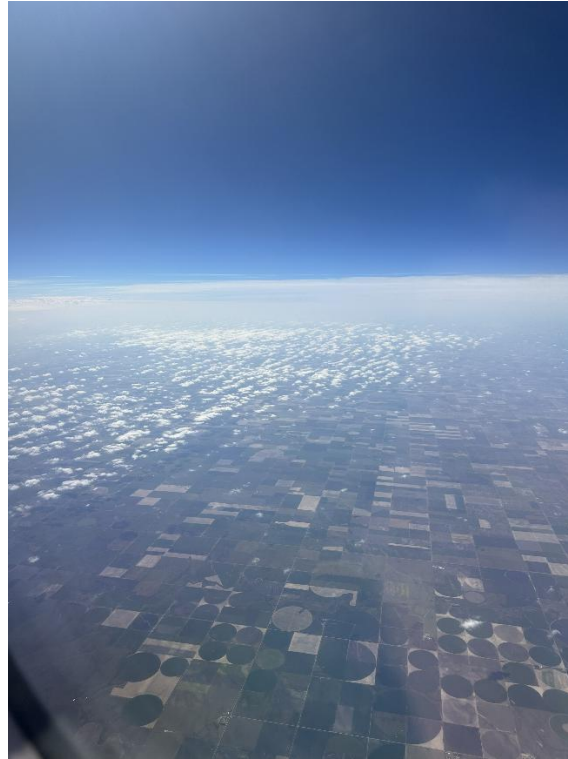


Figure 3 Unedited Image

I am very happy with how the final image turned out. It showcases an excellent example of a formation of altocumulus undulatus clouds and does so in a way that is at least pleasing to my eye. The vantage of the aircraft also gives an interesting perspective; we can more easily see the waves of the cloud formation as they appear in the brief atmospheric instability present on this day. This especially shows how these clouds are a local phenomenon where the conditions are correct for their formation, as we can see different types of clouds in the background as conditions change. I enjoy the sense of scale of the image, heightened by the tiny looking $\frac{1}{2}$ mile fields in the background, which makes the clouds more impressive. This picture showcases the clouds well and does so artfully.

References

- [1] Wikipedia contributors. "Public Land Survey System." *Wikipedia, The Free Encyclopedia*. Wikipedia, The Free Encyclopedia, 6 Oct. 2025. Web. 20 Oct. 2025.
- [2] Wikipedia contributors. "Alto cumulus undulatus cloud." *Wikipedia, The Free Encyclopedia*. Wikipedia, The Free Encyclopedia, 18 Apr. 2025. Web. 20 Oct. 2025.