Cloud Second report: Lenticular Cloud over West Boulder

(This photo was taken at 2:03 p.m. on Oct 19,2025, in University Hill Area, facing northwest.)

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1 Introduction

The purpose of this report is to describe and discuss the cloud image on the cover. High-resolution versions of the image are available on flowvis.org, along with many other inspiring flow images. This image was created for the Cloud Second assignment in the MCEN 5151 Flow Visualization course in Fall 2025.

The purpose of this image was to observe and document an orographically forced lenticular cloud forming under stable atmospheric conditions. The photo captures a huge sheet of lenticular cloud, that almost completely covered the sky above, with a very smooth and uniform underside, like a soft blanket, and the edges form a crisp and sharp boundary.

2 Methodology

2.1 Setup

This photo was taken in the University Hill area, west of the CU Boulder main campus. The camera was facing northwest at a high elevation angle (approximately 45–50° above the horizon). The photo was taken at 2:03 p.m. on October 19, 2025, at an elevation of about 5,400 feet (1,646 m) above sea level. The CU Boulder campus is located at the eastern foot of the Rocky Mountains, where airflow over the terrain often produces mountain-wave patterns and smooth cloud formations. On this day, the atmosphere was stable, and a broad lenticular cloud stretched across the sky.

2.2 Cloud Identification and Atmospheric Discussion

The image shows a single, uniform cloud type: lenticular cloud. I first thought it might be an altostratus cloud, but after discussing it with others, I realized that the crisp edges are more consistent with an orographically forced cloud. This feature reinforces the idea that this is a cloud forming in a stable atmosphere, probably because of topographic forcing.

As shown in Figure 1, the atmosphere was very stable. Compare the temperature profile with the dry adiabatic lapse rate, indicating stable atmosphere. CAPE is zero and LFC is -9999 (0), which means there really wasn't any chance for convection to happen.

The temperature curve also has a couple of rightward 'bows', which can indicate clouds around those levels. The LCLP is around 675 hPa, so the cloud base is probably around 3.5 km. But, in that layer, the temperature and dew point curves aren't close to each other, which suggests that the air at the sounding location was relatively dry.

One possible explanation is that the cloud formed upstream and was then blown over Boulder. The wind bar supports this explanation, since the wind is pretty consistent in direction, mostly coming from the west, which is the rocky mountain.

Another possibility is that the moisture conditions at the sounding location were not exactly the same as the conditions directly over Boulder. It is also possible that the cloud was an ice cloud, since the relative humidity with respect to ice can be higher than it is for water. However, given how thick the cloud looks and the fact that you can't see through it, makes this explanation less likely.

The wind bar shows that the winds are fairly uniform with height, both in speed and direction.

Altogether, this Skew-T figure suggests that the cloud in the photo formed in a stable atmosphere, rather than from any kind of convective activity.

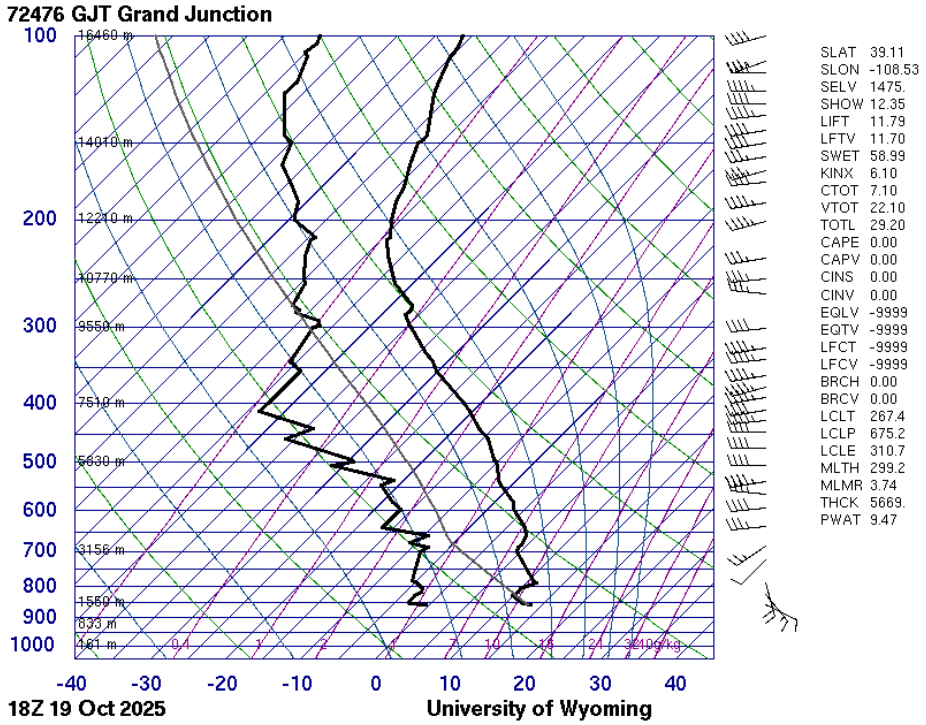

Figure 1 Skew-T diagram from Grand Junction (18Z 19 Oct 2025)

4 Photographic techniques

A Nikon D3500 DSLR camera equipped with an 18–55 mm f/3.5–5.6G lens was used. The lens was set to a focal length of 18 mm, with an aperture of f/8. The lens was set to a focal length of 18 mm with an aperture of f/8. The exposure time was 1/800 s, and the ISO was 400.

The camera was positioned horizontally at approximately 45-50° above the horizon, facing northwest from University Hill area on the west of CU boulder main campus, around (40.01, -105.28).

The image was edited using Darktable. The original photo (Figure 2) had a resolution of 6000 × 4000 pixels. After cropping, the final processed image size was 5986 × 3772 pixels. I removed a street light using the “retouch” tool. No color adjustments were made because the weather was great and natural lighting conditions on that day were already excellent.

Figure 2 Original image

5 Conclusion

The image reveals a broad smooth cloud deck with crisp edges, characteristic of a lenticular cloud formed by stable airflow over the Rocky Mountains. The colorful autumn trees adds warmth and contrast to the cool sky and clouds. If possible, I would also try different shooting positions or angles to avoid capturing the traffic light, since it is difficult to remove cleanly during post-processing. The photograph effectively captures both the visual appeal and the atmospheric physics of a stable, orographically influenced cloud formation.