

“Clouds Second” Report

MCEN 5151-001 Flow Visualization, Fall 2025

Emma Wilder, 11/1/2025



Fig. 1: (A, left) the unedited image, and (B, right) the edited image.

Introduction

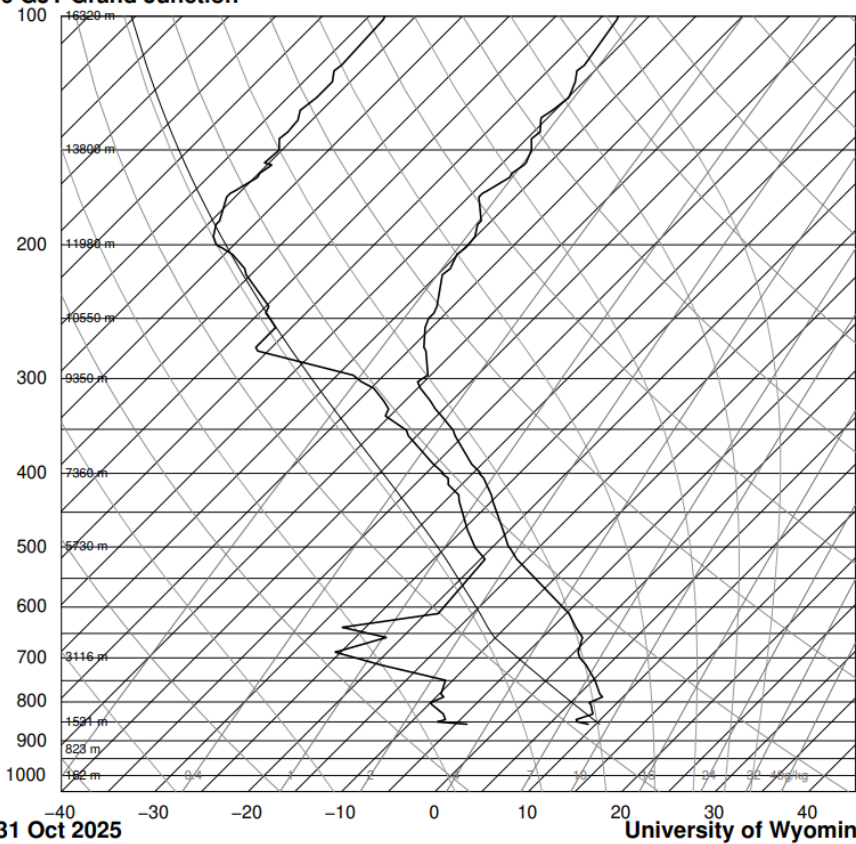
For the Cloud Second assignment, I wanted to capture some less commonly seen clouds since I had already captured cumulus and cirrus clouds. I spotted an interesting cloud formation that I could not initially identify in a certain type. The clouds in the center of the image seem to be clouds of orographic origin (similar to lenticular), with some stratus clouds (possibly cirrostratus) in the top quarter of the image. My Clouds First image only showed clouds and excluded other elements that could have given some context and a sense of scale. So for this image, I wanted to include elements that would not distract from the clouds, but give it a sense of scale and depth and to form a pleasing composition. A local park has an interesting tree that I’ve wanted to capture, and I found that it worked well to give a sense of scale and make an interesting image.

Image Circumstances

This image was taken on October 31, 2025 at 11:32 pm in Van Bibber Park (Arvada, CO, 39°47'47 "N, 105° 9'15 "W) facing due west at an angle of about 10 degrees from horizontal.

Scientific Explanation

The clouds photographed appear to be lenticular in the center and be cirrostratus clouds towards the top. Looking at the Skew-T diagram (Fig. 2, University of Wyoming), which was measured within 30 minutes of when the image was captured, the CAPE (0.00) and slope of the temperature in relation to the adiabatic lapse rate indicates a stable atmosphere. Evidence of cloud formation includes the example line following the wet adiabatic lapse rate at 650 mb (~3800 m or 12,000 feet), and the high relative humidity above 500 mb (~5700 m or 19,000 feet). The lower clouds could be the lenticular clouds in the middle or alto altitude, and the stratus clouds could be the higher clouds, near the border between mid (alto) and high (cirro) altitude.



SLAT	39.11
SLON	
SELV	1475.
SHOW	9.03
LIFT	7.58
LFTV	7.64
SWET	44.00
KINX	-5.10
CTOT	11.10
VTOT	26.10
TOTL	37.20
CAPE	0.00
CAPV	0.00
CINS	0.00
CINV	0.00
EQLV	-9999
EQTV	-9999
LFCT	-9999
LFVC	-9999
BRCH	0.00
BRCV	0.00
LCLT	262.4
LCLP	653.2
LCLC	304.5
MLTH	296.4
MLMR	2.62
THCK	5568.
PWAT	7.22

Fig. 2: Skew-T Diagram of Grand Junction near image capture time, 12 pm (18Z), on October 31, 2025. Obtained from the University of Wyoming.

The night before the image was captured, there was also a stable atmosphere (Fig. 3; CAPE = 0.00). The stable atmosphere during and before the photo suggests that the clouds did not result from instability. Since the winds are generally westerly (Fig. 2-3), this provides more evidence that mountain waves were formed downstream of the mountains, forming potential altocumulus standing lenticularis (ACSL) clouds.

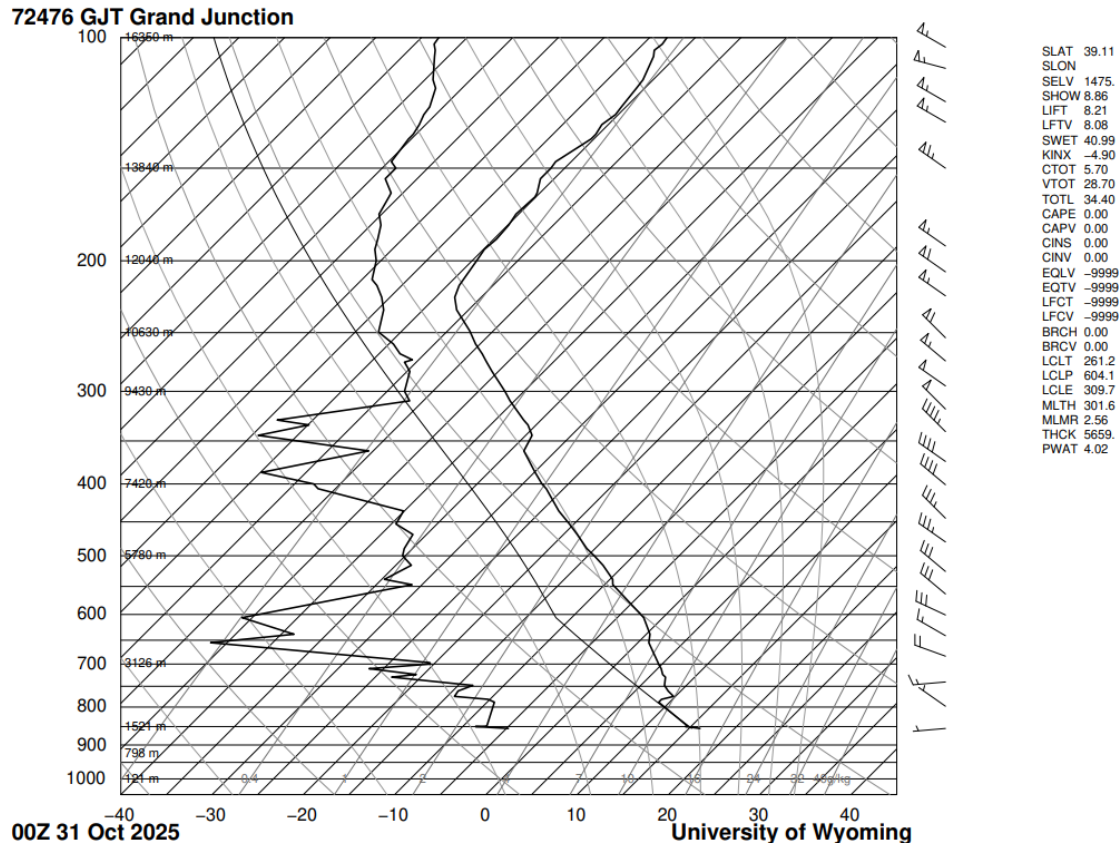


Fig. 3: Skew-T Diagram of Grand Junction the night before image capture, 8 pm, on October 30, 2025 (00Z 10/30). Obtained from the University of Wyoming.

Photographic Technique

An ISO of 100 was used to prevent overexposure in the midday sun while minimizing noise, with an aperture of f/7.1 for ideal sharpness and to minimize refraction, and to have a relatively deep field of view for the four elements to be in focus (the tree, the grass, the mesa, and the clouds). A 1/250 s shutter speed ensured proper exposure while mitigating motion blur since the camera was held in my hand without a tripod. A Canon EOS Rebel T7 (digital DSLR) was used with an EF-S 18-55mm IS II Kit lens. A 49 mm focal length was used show some detail in allow the tree and the mesa, and to fill the frame with the clouds that I found interesting. Slight cropping was used on all edges to remove more distracting elements (mountain silhouette other than the mesa). The original photo was: 6020 x 4015 pixels, cropped to 5637 x 3631 pixels). Edits in darktable included lowering the overall exposure with an RGB curve to see more detail in the cloud shadows, and an increase saturation to have the sky by more blue (Fig. 1a-b).

Conclusion

The image shows an interesting cloud formation (i.e., lenticular) that is not seen every day. I like the layers and sense of scale that the other elements bring, and they do not seem distracting from the clouds. I like the composition with the tree incorporating the rule of thirds. I like that the

edits brought out more of the shadow details in the clouds that were missing when the image was more brightly exposed. If I could change something about the image, and it was possible to get closer to the tree on a trail, I would try to get closer to the tree and experiment with different focal lengths to include more of the mesa, or a wider field of view of the sky.

References:

University of Wyoming, College of Engineering, Department of Atmospheric Science.
Atmospheric Soundings. https://weather.uwyo.edu/upperair/sounding_legacy.html