

Clouds First Report

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Clouds First Assignment (MCEN 4151-001)

Cloud Type: Lenticular Altocumulus

Date and Time: September 21, 2025 – 7:06 PM MDT

Location: Seven Hills, Colorado (40°02'18.5"N 105°20'04.7"W)



Figure 1 - Final image of cloud with post-processing.

Purpose and Intent

The intent of this image was simply to capture an interesting and visually appealing cloud formation. At the time of capture, I was drawn to the structure and layering of the cloud rather than any specific lighting conditions or scientific goal. The warm evening light and distinctive lenticular shape were unplanned aspects that revealed themselves later in review.

Only after analyzing the photo and comparing it with the atmospheric data did I identify the formation as a likely lenticular altocumulus. The image, therefore, evolved from a spontaneous aesthetic observation into a scientifically informative example of mountain-wave cloud formation in a stable atmosphere.

Circumstances of Capture

The photograph was taken from a vantage point at an elevation of 2,500 meters in Boulder County, Colorado, facing west towards the Front Range. The image was captured near sunset under post-frontal, stable conditions. Moist air moving over the mountains produced smooth, lens-like clouds that appeared nearly stationary for several minutes. Below them, fragments of dissipating cumulus indicated the transition from convective to stratified flow as surface heating diminished.

Lighting was entirely natural, provided by the setting sun at roughly 15° above the horizon (solar azimuth $\approx 280^\circ$). The low-angle illumination enhanced the contrast and depth, but was not a deliberate part of the setup; it occurred naturally as daylight faded.

Cloud Identification and Atmospheric Analysis

Although the capture was spontaneous, subsequent analysis identified the cloud as a lenticular altocumulus. Its stationary lens shape, smooth texture, and clear separation from the lower cumulus layers are characteristic of mountain-wave clouds formed by stable airflow terrain.

To support this identification, the 00Z Grand Junction sounding from September 22, 2025 (Figure 2) shows minimal CAPE (≈ 150 J/kg) and a modest inversion near 600 mb, confirming a stable atmosphere typical of wave-cloud conditions. Westerly flow aloft likely generated standing waves downstream of the mountains, lifting moist air to saturation at the crest level. As air parcels descended, they warmed and dried, causing evaporation along the cloud's edges preserving its sharp, lenticular outline. The dissipating cumulus beneath indicates residual convection below a stable layer.

72476 GJT Grand Junction

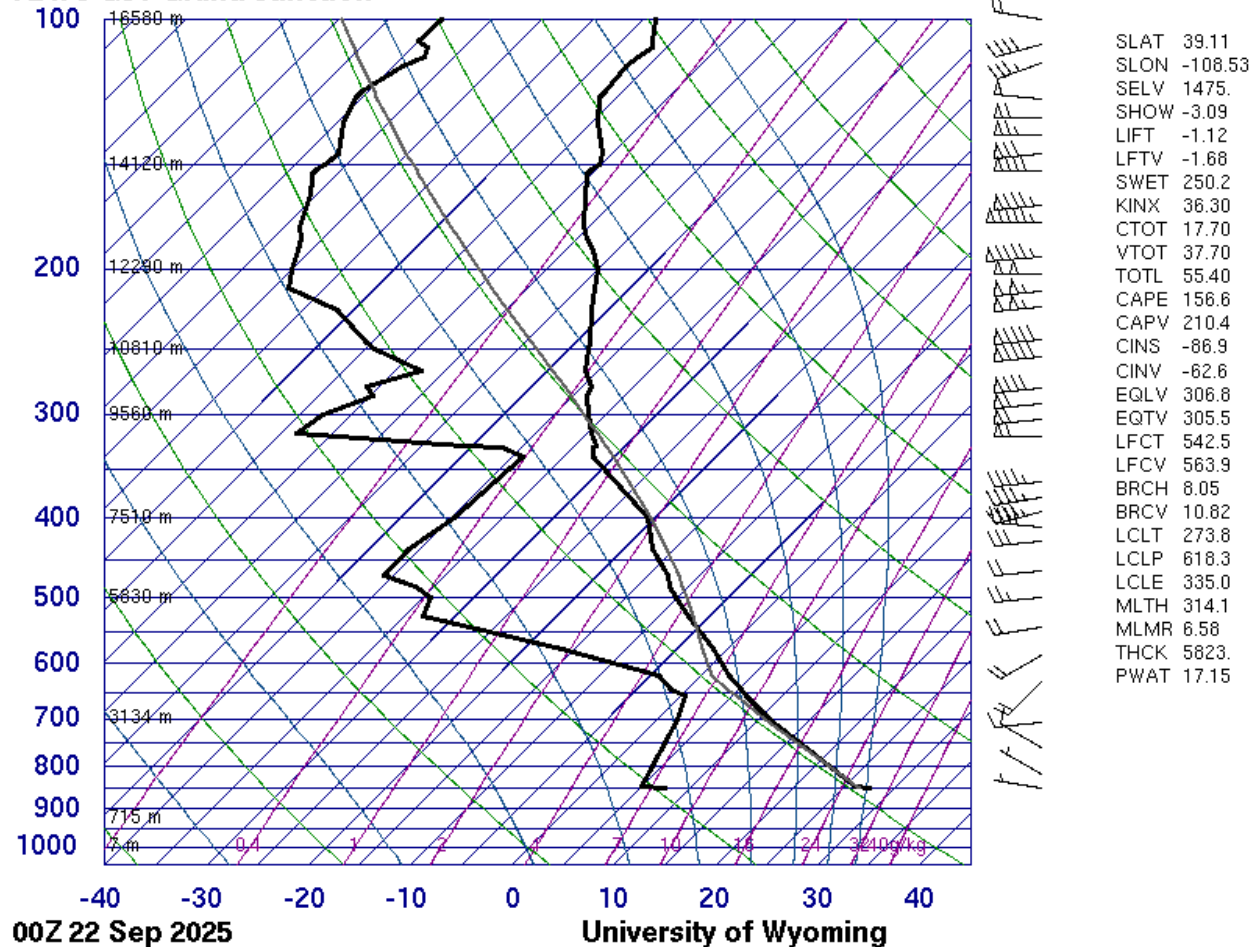


Figure 2 - Skew-T plot from Grand Junction (00Z 22 Sep 2025, University of Wyoming).

Photographic Technique

The image was taken with a Canon EOS 7D Mark II and a Sigma 18-200 mm f/3.5-6.3 DC lens at a focal length of 113 mm, providing a field of view of approximately 11° x 7°. The telephoto framing emphasized the smooth lenticular form and minimized surrounding visual clutter. Exposure settings were 1/800 s at f/6.3 and ISO 200, effectively freezing any motion and maintaining sharpness across the image.

No artificial lighting was used; illumination came solely from the setting sun. Post-processing was performed in Nik Collection Viveza 3, where selective tonal and color adjustments were applied to enhance the structure and contrast while preserving a natural appearance. Global adjustments included a moderate decrease in brightness (-15%) and warmth (-20%), with slight increases in contrast (+10%) and saturation (+20%). Structure was increased (+75%) to bring out fine detail in the lenticular layers, and shadow levels

were slightly reduced (–10%) to balance midtone depth. The final image was also cropped to improve composition and focus attention on the primary cloud formation. The original image measured 5472 x 3648 pixels, while the final post-processed version was cropped to 3804 x 2717 pixels, refining the composition without significant loss of resolution.



Figure 3 -- Original photograph (jpg) before post-processing.

Conclusion

The final image effectively balances artistic composition and scientific relevance, even though the scientific significance was realized after capture. The warm evening light accentuates the layered, laminar form, revealing the flow structure of the stable atmosphere. The inclusion of dissipating cumulus below adds context, contrasting turbulent convective motion with smooth, stratified flow aloft.

Minor haze softens fine detail along the cloud's edge, and a tighter crop could further isolate the lenticular form, but the photograph clearly communicates the underlying physics. The image demonstrates how natural, unplanned observations can still yield meaningful insights into atmospheric motion, here visualizing the invisible standing-wave pattern made visible by condensation.

References

University of Wyoming Atmospheric Soundings – Grand Junction, CO (00Z 09/22/25)

<http://weather.uwyo.edu/upperair/sounding.html>

Wallace, J. M., & Hobbs, P. V. (2006). Atmospheric Science: An Introductory Survey (2nd ed.). Academic Press, Elsevier. ISBN: 978-0-12-732951-2

<https://www.sciencedirect.com/book/9780127329512/atmospheric-science>

Flow Visualization – Cloud Classification Guide (Clouds 1–6). University of Colorado Boulder, FlowVis Course Resources.

<https://www.flowvis.org/Flow%20Vis%20Guide/clouds-1-names/>