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MCEN 5151
11/28/2022
Clouds 1
Alto cumulus Lenticularis
October 25, 2022 7:27 AM
Boulder, CO



Introduction

The objective of this image is to capture an interesting cloud phenomenon and analyze the atmospheric conditions that arose to produce it. This image was intended to showcase a unique cloud overhanging Boulder, CO on the morning of October 25, 2022. The distinct line of clouds contrasting the blue of the sky was very beautiful.

Location Details

Location	Boulder, Colorado
Camera Direction	Southwest
Elevation Angle	75 degrees
Date and Time	October 25, 2022 7:27 PM

Cloud Physics

The clouds appearing in this image are altocumulus lenticularis. Altocumulus lenticularis clouds are patch in the shape of a lens or almond, often very elongated and usually with well-defined outlines. The patch can be small elements, closely grouped together; or one generally smooth unit with pronounced shadings. [4]. Because they usually form as a result of a large object disrupting air currents, they're more often observed near mountainous regions [1].

Below is the corresponding skew-T diagram at the time and location closest to where and when the photo was taken. The skew-T diagram shows data from Grand Junction, Colorado at 6:00 AM. This is close enough for an initial estimate of the stability of the atmosphere, but there is some inherent error using data from a location so far from the location of the image.

According to the plot, the atmosphere was entirely stable, as evidenced by the CAPE value of 0.00. A value of zero denotes a fully stable atmosphere, while a value of a few hundred is weakly unstable. Additionally, the plot shows that clouds are likely to form at an altitude of roughly 3100 meters. This is consistent with where altocumulus clouds typically appear in the atmosphere, leading to the conclusion that this is the correct cloud identification.

72476 GJT Grand Junction

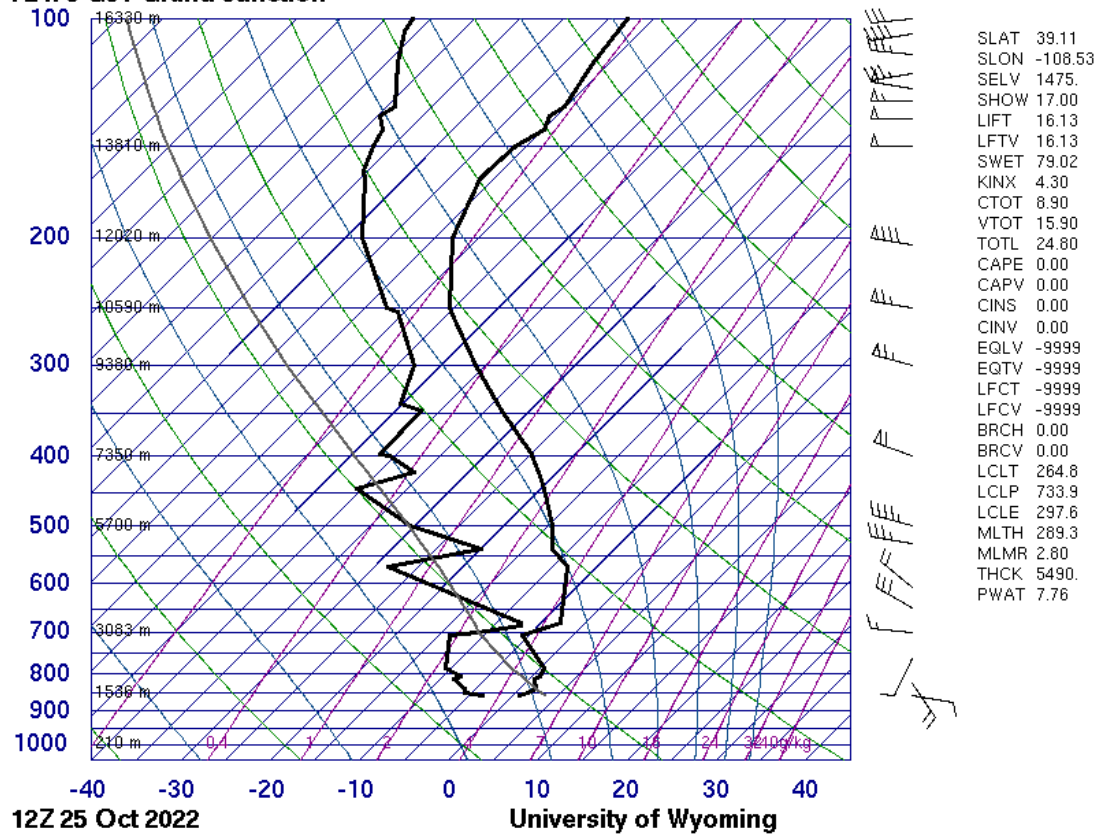


Figure 1: Skew-T diagram from the University of Wyoming [2]

Photographic Technique

This image was taken using an iPhone X with an 4mm (28mm equivalent) lens. The properties for my final image are tabulated below.

Image Property	Value
Shutter Speed	1/120 sec
Focal Length	4 mm
ISO	N/A
Aperture	f/1.8

Pixels	4032 x 3024
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Table 1: Photograph Specifications

The field of view of the image according to camera specifications was 66 degrees horizontally and 46 degrees vertically. For this image, only one edit was made. The image was slightly cropped to remove the light post in the lower right corner of the original image.



Figure 2: Original Image



Figure 3: Final, edited image

Conclusion

This image was very intriguing to me as it is unique to see clouds covering the sky with such a distinct boundary. I also elected to only crop this image rather than adjust any of the other quantities because I thought this was naturally beautiful on its own. I also elected to keep the mountains and trees in the final image because it was a good reference, and the image was a little boring without it. Overall, I am happy with how this picture turned out.

References

- [1] "Alto cumulus Lenticularis." What's This Cloud, <https://whatsthiscloud.com/lessons/altocumulus-lenticularis/>.
- [2] "Atmospheric Soundings." University of Wyoming, <http://weather.uwyo.edu/upperair/sounding.html>.
- [3] "Clouds 3: Skew – T and Instability" Flow Visualization, <https://www.flowvis.org/Flow%20Vis%20Guide/clouds-3-skew-t/>
- [4] "Alto cumulus Lenticularis" World Meteorological Organization, <https://cloudatlas.wmo.int/en/species-altocumulus-lenticularis-ac-len.html>