Cloud First Report

Caidan Caswell, Cloud First, MCEN 4151
Cloud Type: Altocumulus
Date: August 20, 2024
Time: 7:53 PM
Location: Near Eldorado State Park and Golden, Colorado

Figure 1: Post-Processed Cloud Image

Context and Purpose

This image was captured as part of the second cloud assignment for my flow visualization course (PHYS 3220). The intent behind this image was to capture an example of cloud formation during sunset and observe how the changing light interacted with the clouds. I was particularly interested in identifying the cloud type and analyzing its formation using atmospheric data from a skew-T plot. The assignment allowed for the observation of weather patterns and cloud behavior during a serene evening.

Circumstances

The photo was taken near Eldorado State Park, facing west at an angle of about 15° from the horizontal. It was taken on August 20, 2024, at 7:53 PM, a time when the sun had nearly set. The colors in the sky were transitioning, casting pink hues on the clouds. The surrounding mountains of Boulder were visible, and the camera was angled to capture both the clouds and part of the landscape.

Cloud Analysis

The clouds in the image appear to be *altocumulus*, indicated by their mid-level altitude and the distinct wave-like formations. The color of the clouds reflects the late sunset, with the rest of the sky appearing mostly clear, indicating a stable weather pattern. Using the atmospheric data from the skew-T plot provided by the University of Wyoming for 00Z on August 20, 2024, from Grand Junction (GJT), we can assess the atmosphere's stability.

The skew-T diagram shows that the CAPE (Convective Available Potential Energy) is 821.5 J/kg, which indicates moderate instability, suitable for the formation of mid-level clouds like altocumulus. The LCL (Lifted Condensation Level) is around 633.1 hPa, which translates to a cloud base altitude of approximately 1540 meters, consistent with the observed altocumulus clouds. Winds were moderate, which helped maintain the relatively calm formation of these clouds. There was no significant precipitation or rapid changes in the weather leading up to this image, nor in the few hours following.

Photographic Technique

This image was captured using an iPhone 15 Pro. The camera was positioned about 10 feet from the nearest foreground tree, with the clouds several kilometers away. The lens was set at a 24mm focal length, with an ISO of 32 and an aperture of f/2.2, while the shutter speed was set to 1/932 seconds. The large depth of the field allowed both the trees and clouds to be in focus.

No significant post-processing was done beyond slight contrast adjustment to bring out the vibrancy of the pink in the clouds.

The final image resolution was 3024 x 4032 pixels, and it represents a wide field of view that captures both the landscape and sky, emphasizing the altitude of the clouds and their formation.
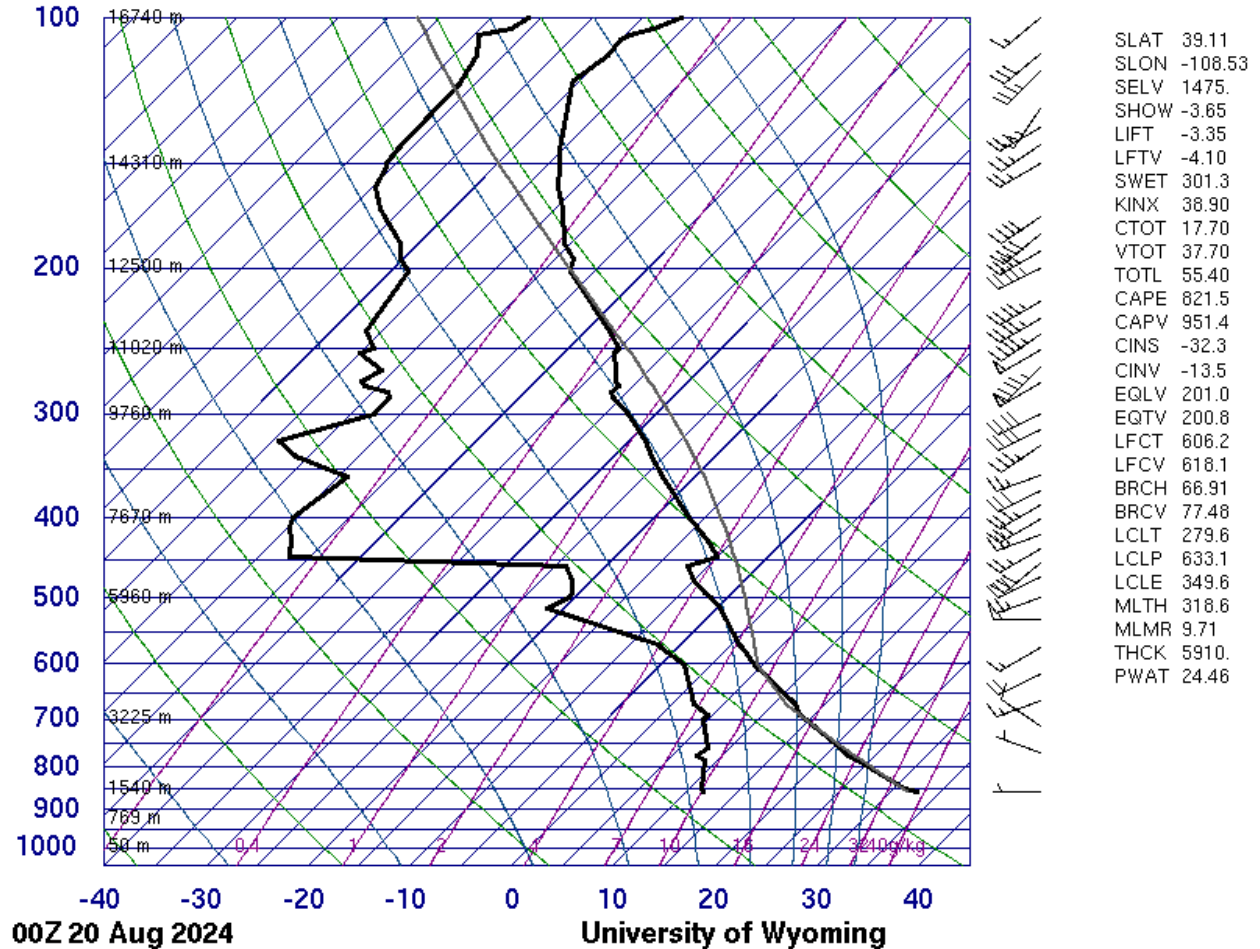

Figure 2: Skew T diagram 20 Aug 2024

Image Analysis

What stands out in this image is the vivid contrast between the pink clouds and the blue sky, which highlights the effect of the sun setting at a low angle. The fluid dynamics of the clouds are well displayed, showing layers of condensation that align with the stability suggested by the skew-T data. The subtle wavelike pattern of the altocumulus clouds indicates limited vertical motion, consistent with atmospheric stability.

I am satisfied with how the clouds are portrayed, though the image could have benefited from a slightly wider field of view to capture more of the surrounding sky for a broader context. In terms

of further developing this idea, experimenting with different times of day or different types of weather conditions would provide a more comprehensive study of cloud behavior.

References

- Atmospheric Sounding Data: University of Wyoming Sounding for 00Z, August 20, 2024.
- Skew-T Plot, Grand Junction (GJT), University of Wyoming.
- Cloud Identification Guide, American Meteorological Society.