Clouds Second

GROUP: Bryce Dickson, John Whiteman, Tobin Price, William Watkins

MCEN 4151

Professor Hertzberg

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Introduction and Background

The purpose of this photo is for the "Clouds Second" assignment, which Professor Jean Hertzberg assigned for the course Flow Visualization at the University of Colorado at Boulder. The objective of this assignment was to capture a visualization of the physics behind a cloud in a way that is aesthetically pleasing, in addition to identifying the type of cloud using information from a Skew-T plot from the day that the photo was taken. I attempted to capture a photo of a cloud above the flatirons in a way that showed the aesthetics of the cloud in addition to the flow phenomenon.

Team

This assignment was completed with the following team members:

1.) Bryce Dickson
2.) Tobin Price
3.) William Watkins
4.) John Whiteman

Procedure

The image I submitted for the Clouds Second assignment was captured on Table Mesa drive in front of the Boulder Creek Apartment Complex facing away from the flatirons. I held my camera slightly above my head to get a clear shot of the clouds while still allowing the tops of the trees and the apartments to be visible. I wanted to capture the full extent of the cloud phenomenon without letting the apartments and trees interfere too much. Although I wanted to exclude most of the surroundings, I wanted to keep the trees as their colors were very complimentary to the sunset, which provided an aesthetically pleasing aspect of nature for the image. The image was taken at approximately 6:33 PM on Saturday, October 25th. I wanted to take this photo within an hour of the sunset to capture a beautiful photo of the clouds with aesthetically pleasing colors.

The Physics behind the Phenomenon

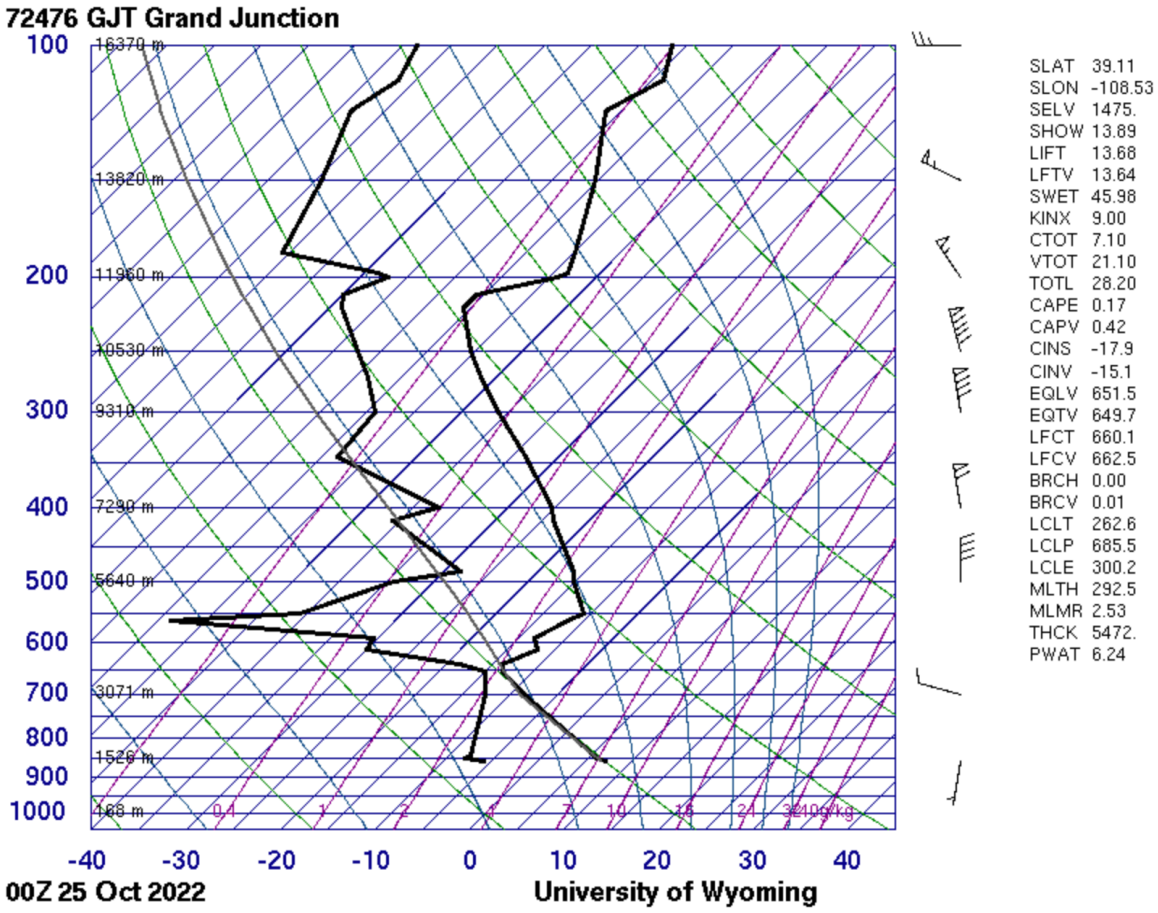

Figure 1: *Skew-T Plot for Grand Junction on October 25th, 2022.*

The Skew-T plot on October 25th, 2022, seen above, shows an altitude of approximately 3700 meters (12139.11 ft.) where the dew point temperature and actual temperature are close. This allows me to assume that this is the most likely altitude for the clouds seen in the original photo. In addition, the CAPE value shown above of 0.17 indicates that the atmosphere was unstable, which does bolster the intuition of the type of cloud (typically, a cape value >0 will indicate an unstable atmosphere). This leads me to believe that the clouds in the photograph are Altocumulus due to the altitude as well as the stability of the atmosphere. Finally, the slopes of the adiabatic temperature lines and isotherms indicate an unstable atmosphere as well.

Photography Technique

Figure 2: *The Original Cloud Photograph after cropping (top) and the Edited Cloud Photograph (bottom).*

In order to take the photo, I used my iPhone 12 Pro. I made sure to stand at a location that prevented the clouds from being blocked by trees or the apartments. I took the photo in the center of the Boulder Creek Apartment Complex to get a full view of the clouds during the sunset. I

took the photo at 6:33 PM on October 25th, which was near sunset, allowing for a fascinating depiction of the clouds. This iPhone has various settings as well as three different camera lenses. I used the back dual wide camera (focal length of 4mm) 4.2 mm using an aperture of f/1.6. I used an exposure of 1/725 and an ISO value of 32. The original image has a resolution of 4032 x 3024 pixels (width x height). For the editing in the dark table, I cropped the image, adjusted the RGB curve, and changed the contrast values. This allowed me to see the complete form of the clouds in the photo.

Conclusion

My photo captures a beautiful depiction of the physics behind an Altocumulus cloud. I admire the details of the different forms of the clouds that I was able to outline through post-processing of the image, which did an excellent job of highlighting the features of the form of the clouds. The differences in color from the sunset were also very aesthetically pleasing as they show the different shapes from the fluid flow. For future work, the location where I took a photograph could be improved by taking the photo at a higher altitude to allow me to get the apartments out of the photo. In addition, using my Canon Rebel T7 DSLR Camera instead of the iPhone might provide a better resolution for the photo. Finally, taking this photo at sunrise rather than sunset could provide better images of the clouds or lighting. Regardless of these future suggestions, my image demonstrates an aesthetically pleasing visualization of these altocumulus clouds and the physics behind the cloud's fluid flow phenomenon.