Cloud 2 Report

Author/Videographer: **Ryan Wells**
Assignment: **Cloud 1**
Course: **MCEN 5151, Flow Visualization**
Date: **October 24, 2022**
Cloud Type: **Cirrostratus**
Image Time Stamp: **November 16, 2022 16:41 MST**
Image Location: **Engineering Center University of Colorado-Boulder Boulder, CO (40.0076° N, 105.2659° W)**

Figure 1, Image taken of Cirrostratus Clouds in Boulder, CO on November 16, 2022

Introduction

The image above in Figure 1, was taken for the Second Cloud project in the MCEN 5151, the Flow Visualization course at the University of Colorado, Boulder during the Fall 2022 semester. The purpose of Flow Visualization is to capture and observe fluid phenomena while exploring the interface between art and science [2]. The image in Figure 1 depicts Cirrostratus clouds in Boulder, Colorado on November 16, 2022. Cloud pictures were taken for this assignment over the course of a month to capture common cloud phenomena that occur daily in Colorado. The image in Figure 1 was chosen because it depicts a large cloud looming over the Flatirons in Boulder during sunset. The intent of this image was to capture a unique cloud formation at a vibrant time in the evening, sunset sky.

Image Circumstances

The image in Figure 1 was taken at 40.0076° N, 105.2659° W, otherwise known as the Engieering Center at University of Colorado, Boulder in Boulder, CO. The photo was taken on the east side of the engineering center at an elevation of about 5,430 feet above sea level. The camera direction was facing West and about 45 degrees above the horizon in order to make the large unique cloud the main subject in the frame. It was 4:41 PM Mountain Standard Time on November 16, 2022 when the photo was taken.

Cloud Information

The image in Figure 1 depicts Cirrostratus clouds with one large one in the right above the mountains. Below is the Skew-T Plot from the Grand Junction weather station on the University of Wyoming website for atmospheric data.

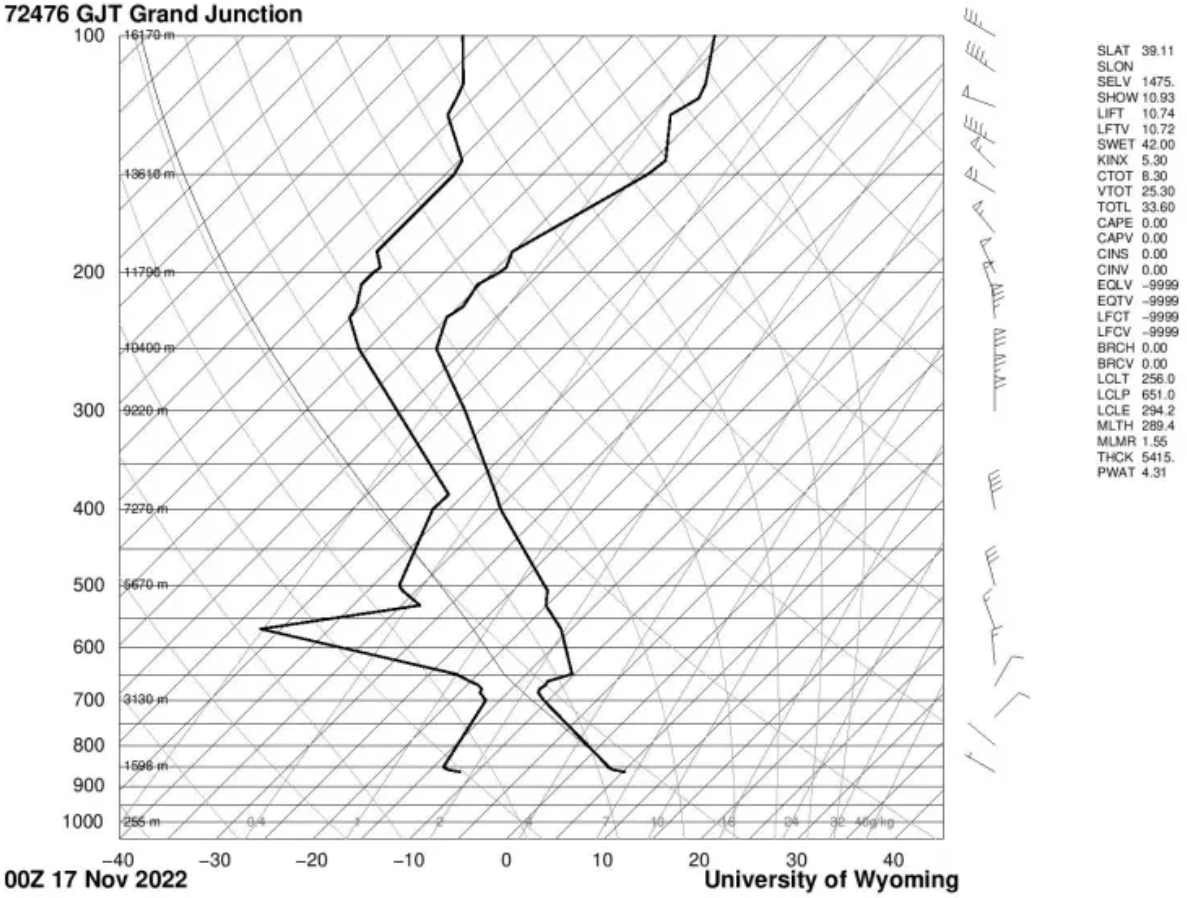

Figure 2, Skew-T Plot for the Time of Image in Figure 1 from University of Wyoming

The Skew-T plot above in Figure 2 shows that on the day of the image clouds formed at about 7400 meters, or 22,200 feet. Cirrostratus clouds commonly occur at around 7000 meters, aligning with the image and the Skew-T chart from that day. There was no precipitation that day, or after the time that the image was taken. The wind was relatively mild for that day, however there was a front incoming as indicated by the cirrostratus clouds. The clouds around that time were somewhat similar although there was some snowfall and storm clouds in the days after. The rest of the sky was a similar blue with sunset colors with very few other clouds in the surroundings. Cirrostratus clouds are formed due to slow rising air and often form before a front comes in [1]. Clouds stay formed and in the sky due to the wind and the subsequent lift, upward force, it provides to keep condensed water vapor suspended in the air.

Photographic Technique

This photo was taken with an iPhone 12 Pro digital camera using 1.0 times zoom. Estimated with a cloud elevation of about 22,200, the distance from a center cloud (object) to the lens is about 30,000 feet. The ISO, Shutter Speed and Aperture are automatic for the iPhone Camera and estimated to be about ISO 25, a 1/888 shutter speed, f/2.0 aperture, along with a 6 mm focal length. The original image, depicted in Figure 3 below, was shot at 4032 by 3024 pixels while the final image was cropped down to

3606 by 1200 pixels. The processing applied to this image was to make the RGB curve into an S shape, adding heavy contrast to bring out the blue of the sky, cropping, sharpening, and some rotational correction.

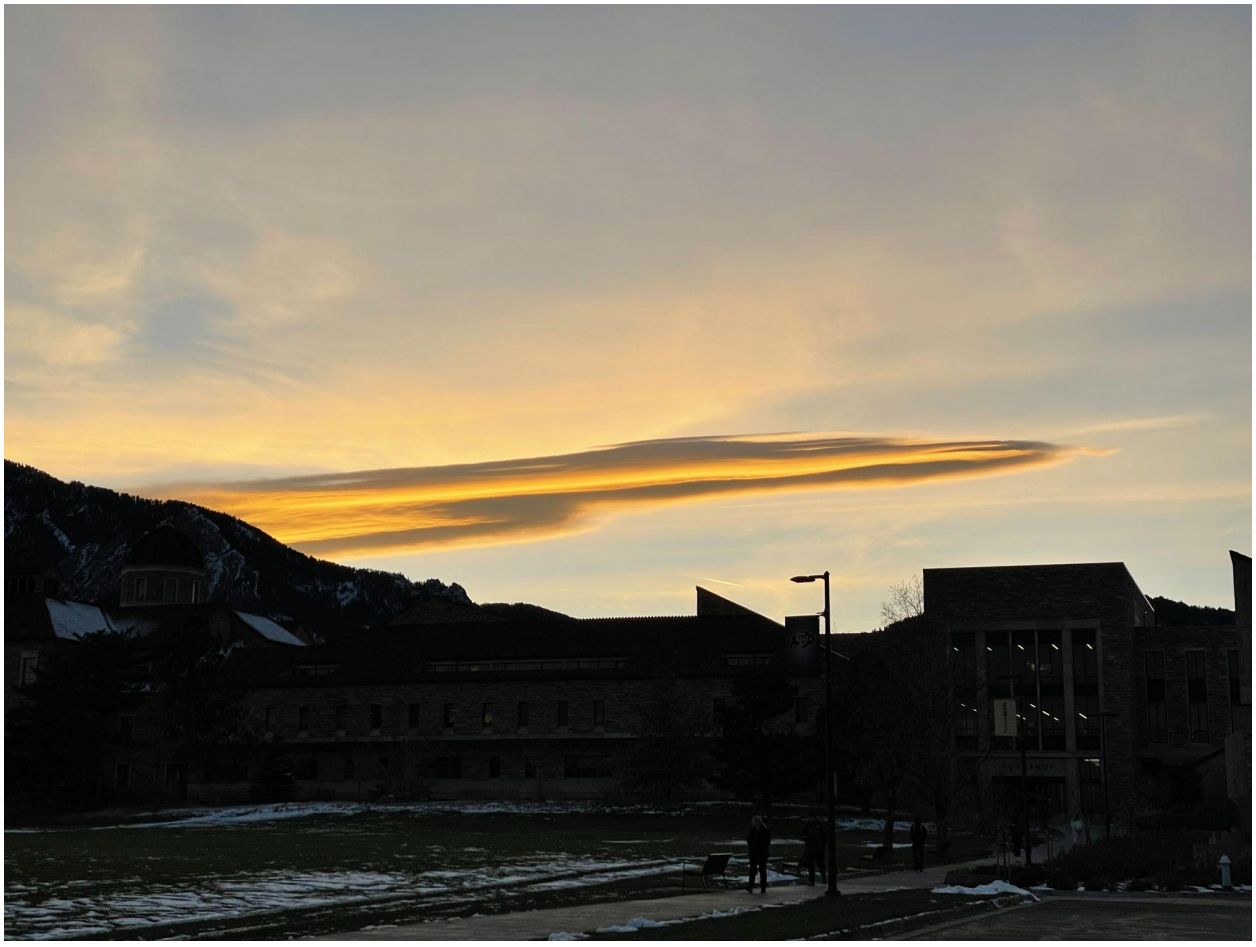

Figure 3, Original image of image in Figure 1

Image Conclusions

The image in Figure 1, the final image, reveals a beautiful cirrostratus cloud hovering over the mountains of Boulder. I really like the contrast of the blue sky with the orange and yellow in the cirrostratus cloud that mimics the shape of a spaceship. I believe the fluid physics are shown as the flat bottom of the cloud that depicts lift from wind and how the water vapor is suspended in the air, the very essence of a cloud. I wonder about how the horizontal wind coming up from the mountains affect the formation layout of the clouds. I would love to develop this idea and image more into a photo of cirrostratus clouds at other times at sunset to find different and more vibrant colors. I think deeper oranges, reds, and yellows, mixed with a darker blue sky could result in some amazing colors that could capture the real beauty of a mountain sunset.

References

[1] “Cirrostratus Clouds.” *Met Office*, https://www.metoffice.gov.uk/weather/learn-about/weather/types-of-weather/clouds/high-clouds/cirrostratus#:~:text=How%20do%20cirrostratus%20clouds%20form,in%20the%20next%2024%20hours..

[2] Hertzberg, Jean. “SYLLABUS MCEN 4151/5151/ FILM 4200/ ARTF 5200/ ATLS 4151/5151 Flow Visualization: The Physics and Art of Fluid Flow Fall 2022.” *FLOW VISUALIZATION A Course in the Physics and Art of Fluid Flow*, 18 Aug. 2022, https://www.flowvis.org/wp-content/uploads/2022/08/syllabusF22.pdf.