Cloud First

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MCEN 4043: Clouds First

Date: 10/24/2022

I. INTRODUCTION

The inspiration for this image was to capture interesting clouds between the beginning of the semester and the middle of October. I was struck by these lone clouds on the evening of September 16th and captured this image on my phone. There were a few occasions when I saw some incredible clouds while biking home from school, but I was never at a vantage point that could capture an interesting and appealing photo.

II. CIRCUMSTANCES

This image was taken in Boulder at approximately 5,500'. I am pointing NWW, and my camera is at an angle of about 10 degrees to the horizon. The image was taken at 7:27 pm, and sunset occurred at 7:08 pm, so I was capturing the last light of dusk.

III. PHENOMENON

The image likely captures the mountain wave –or lenticular– cloud phenomenon. The reasoning is that the cloud in the background is a standalone, round cloud and that the atmosphere was very turbulent with a high CAPE value per the Skew-T diagram for this day, as seen in Figure 2. The University of British Colombia has a great diagram depicting lenticular clouds, as seen in Figure 1. As winds rush over a mountain range, oscillations occur and condensation and evaporation are happening almost instantaneously at the top of these oscillations (UBC ATSC 113).

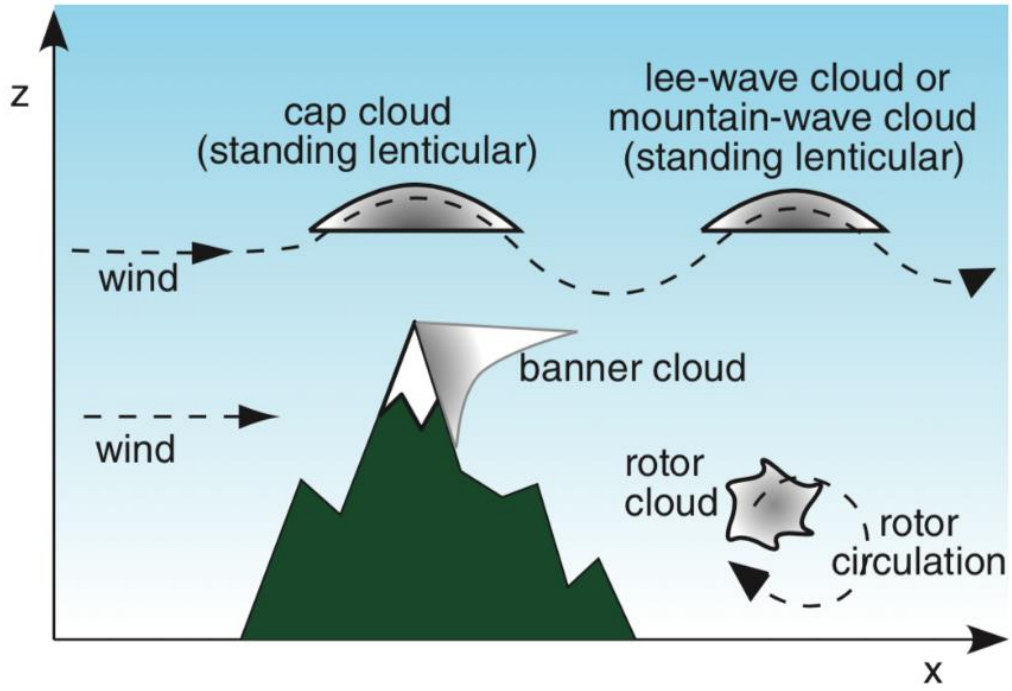

Figure 1. A diagram for the University of British Colombia Atmosphere Sciences department showing how lenticular clouds form over mountains.

Additionally, the Skew-T diagram shows high winds in the upper atmosphere, which contribute to the creation of mountain wave clouds. The high CAPE value doesn't make a lot of sense because the day was relatively calm with not much cloud cover. The weather the next day was also relatively calm. Neither day had any precipitation. One thing to note is that the Skew-T diagram might not match particularly well to the day, because the weather over Boulder may have been more localized and the weather balloon goes up in Grand Junction. The Skew-T doesn't show any locations that will definitely have clouds, but the ones that exist are likely at about 4000m since they appear to be low hanging. This aligns with a stratus

lenticularis cloud because it is low relative to the ground, is relatively flat, and occurs in isolation above the Front Range Mountains, as found in the Clouds 1 section on the Flow Vis website (Clouds 1: Names).

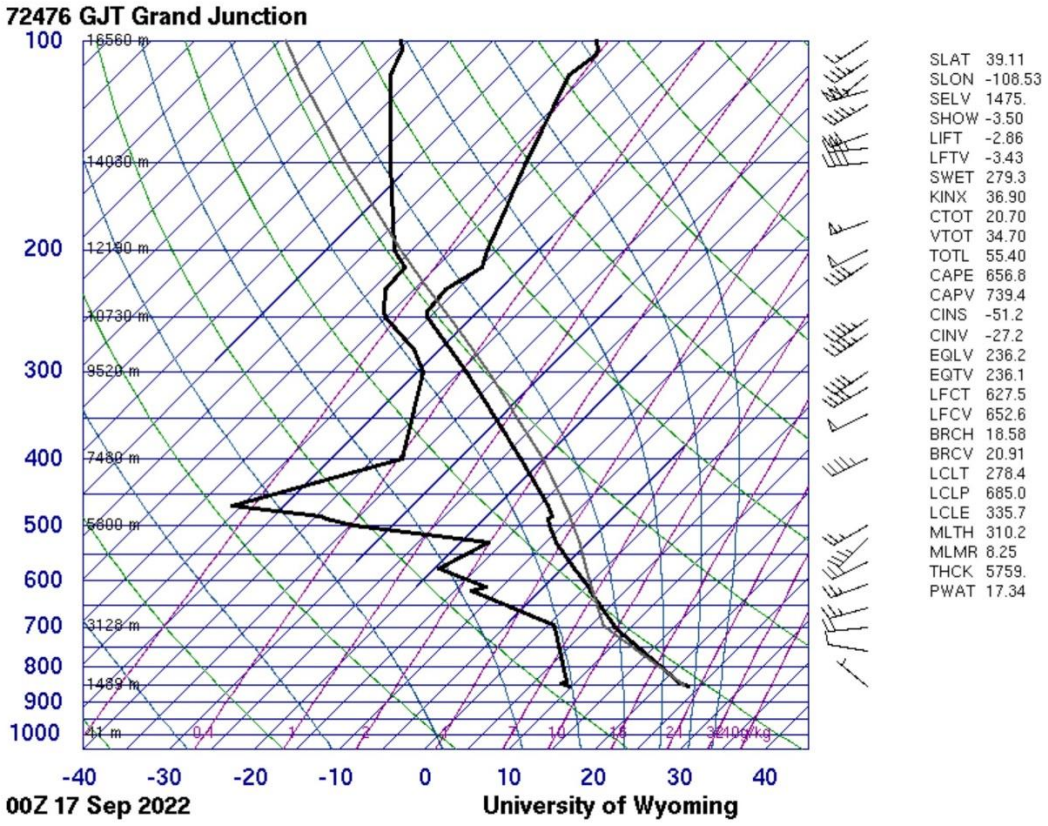

Figure 2. A Skew-T diagram from Grand Junction, Colorado taken at 6pm local (00Z) time. The Skew-T shows an unstable atmosphere with high winds in the between 6000m and 16000m.

IV. PHOTOGRAPHIC TECHNIQUE

While taking my photo, I had some natural framing from the two trees on both sides of the image. They are spaced about 10 ft apart in real life and are approximately 10 ft from the lens. The field of view is approximately 6’ x 15’ using the light pole and the end of the driveway as a reference. I took this photo with my iPhone X wide camera. Its aperture was f/1.8, its ISO was 400, its focal length was 4mm and the shutter speed was 1/30sec. Taken on a 12 MPx sensor. The original image is 4032px x 3042px, and the final image is 3459px x 2290px.

To process my image, I focused heavily on adding more color to the image. I wanted the foreground to be lit up as well as the clouds and background. My saturation value was high and I also altered the RGB s-curve heavily to accomplish this. The before image can be seen below in Figure 3.

Figure 3. Pre-processed image.

V. IMAGE

The image reveals a beautiful evening in Boulder. I am proud of my image because I captured a beautiful moment in daily life after work this summer. Capturing this image was a reminder to take in the amazing environment that we are surrounded by. The image shows an interesting cloud that occurs with some frequency in the Boulder area, that is much less common in other parts of the world where mountains are less common. I am disappointed that the Skew-T chart does not exactly match the weather I was seeing this day, and wish that there was still a Denver weather balloon. I am excited to capture more cloud pictures and am eager to go to other locations to see what else I can capture.

VI. APPENDIX

a. Bibliography

"Clouds 1: Names." *Flow Visualization*, https://www.flowvis.org/Flow Vis Guide/clouds-1-names/. Accessed 23 Oct. 2022.

UBC ATSC 113 - Lenticular Clouds. https://www.eoas.ubc.ca/courses/atsc113/flying/met_concepts/01-met_concepts/01b-special-clouds/lenticular.html. Accessed 23 Oct. 2022.