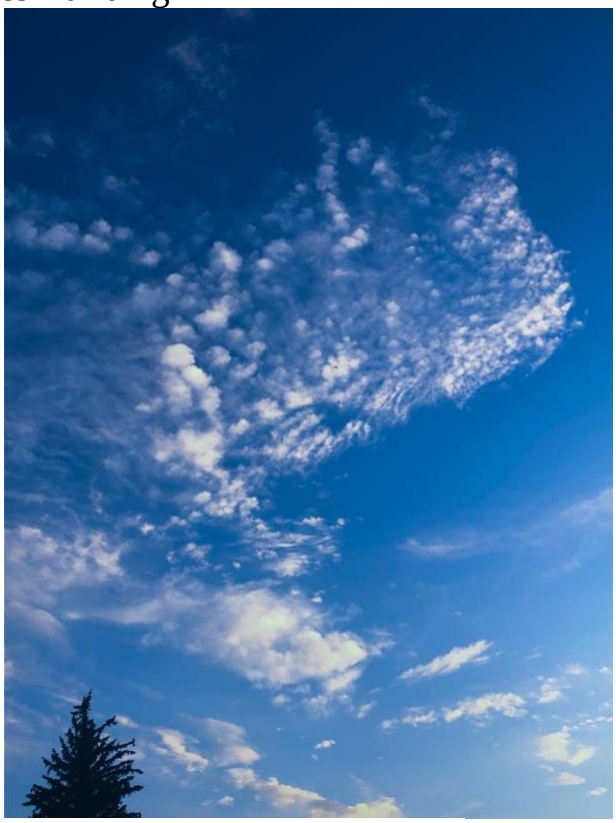
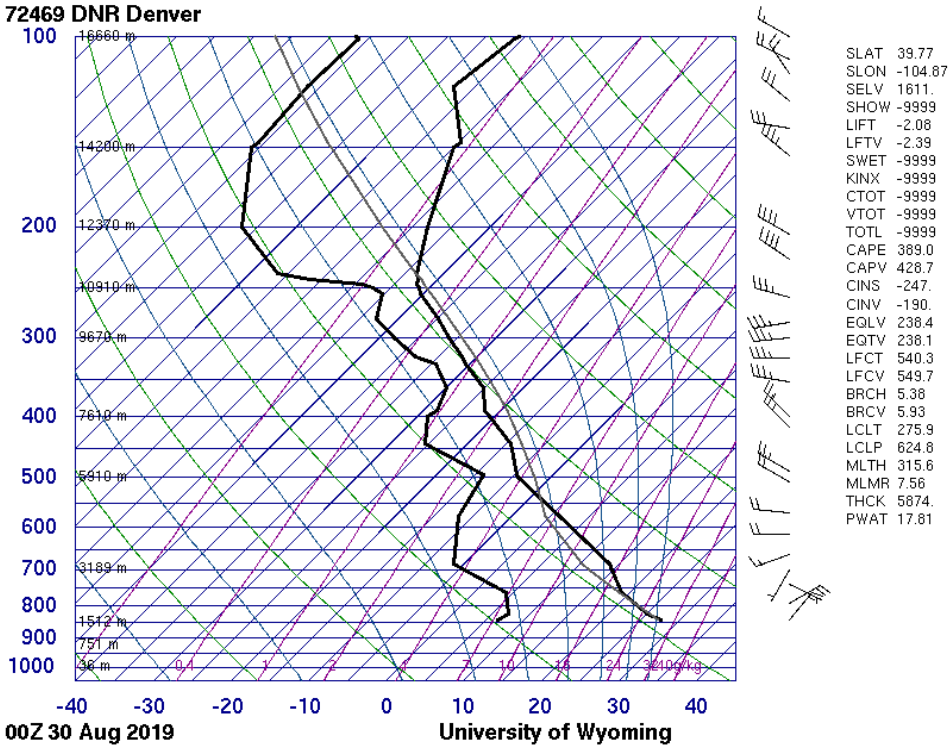
Clouds First
Meg Ivy
ARTF 5200

Cirrocumulus Clouds

7:27 PM August 29th, 2019
Duane Physics Building





Introduction

The purpose of this image was to capture clouds naturally occurring in nature. Then, the clouds would be identified and the nature and conditions behind their specific occurrence would be studied. My focus behind capturing clouds was to capture an image that had dimension and some diversity from the cumulonimbus thunderhead clouds often seen in August. In the above images, the original cloud capture is on the left next to the edited image on the right. Below the two images is the skew-T plot[2], which displays atmospheric data collected around the same time as the image was taken.

Image Context and Purpose

The image was taken outside the Duane Physics Building in Boulder, Colorado. The camera was facing south-east at the clouds at an approximate angle of 85˚ from horizontal. When the image was captured, it was 7:27 PM on August 29th. On that day, the weather was around 94˚F for the high and 56˚F for the low[1]. There was no precipitation on that day, and the rest of the sky was fairly clear throughout the day and when the image was taken.

Cloud Description

When clouds form, water vapor in the air condenses into water or ice. In the skew-T diagram, this can be seen when the dew point (the heavy black line on the left) converges with-or close to- the line indicating actual temperature (heavy black line on the right. The clouds captured in the image can likely be classified as cirrocumulus clouds. This type of cloud normally occurs at around 10,000 m above the ground in the troposphere. At this elevation on the skew-T diagram, there is a convergence of the dew point and temperature lines, confirming there were likely clouds at this altitude. These clouds also usually occur in unstable atmospheric conditions, which is confirmed by the CAPE value of 389 on the skew-T plot[2]. A CAPE value greater than one indicates an unstable atmosphere. In addition, the skew-T plot at 10,000 m indicates there were fairly strong winds coming in from the north-west. All this data from the plot likely confirms the clouds were cirrocumulus.

On August 29th, The Weather Protection center identified the Colorado region as a high-pressure system surrounded by two low pressure systems[1]. When this occurs, air tries to move out and causes clockwise circulation. Although this usually occurs when there is no atmospheric instability, there was no weather front, which could explain this pressure system. These clouds usually occur when warmer, moist air near the ground rises above the higher cold air.

Photographic Technique

This image was taken on an iPhone 8, which has a 12MP wide camera with an f/1.8 aperture. The focal length was 3.99 mm, 1/300 sec shutter speed, and ISO 20. The ISO and shutter speed were fairly low because there was plenty of natural light, and the clouds were not moving rapidly. The distance from the clouds to the lens was about 10,000 m, since the clouds were basically right overhead. The size of the field of view was approximately 2-3 km x 2-3 km.

The images 3024 x 4032 pixels in size for the original and final images. After the photo was taken, it was lightly processed in photoshop. No cropping was done because the clouds filled the image well and the tree added depth and scale to the clouds. The exposure was lightly increased, and the tone was adjusted to be slightly bluer. Although the blue tone of the sky is slightly unrealistic for the time of day when the image was taken, I chose to use this color because it created a bright, sunny day mood for the image.

Conclusion

In conclusion, I feel the image clearly captured the clouds well and allowed for adequate identification of cloud type. The image reveals clouds that form in unstable atmospheric

conditions, even though the atmosphere felt stable from where the image was taken. In the image, I dislike that the tree became very dark when contrast and tone were adjusted. As far as fluid physics are concerned, I feel the image captured the phenomena associated with these clouds correctly. The questions I have relate to the physics occurring in the atmosphere: What other physics are occurring that make these clouds form and did I correctly explain them? Since I do not know fluid physics or physics of the atmosphere, I described them to the best of my ability, but I understand it might be incorrect. If the image or the idea were to be developed further, I would want to try to take a photo of these clouds from above in an airplane for a different perspective.

References

1. National Centers for Environmental Prediction, Weather Prediction Center. (2019, August 30). Daily Weather Maps. Retrieved October 28, 2019, from https://www.wpc.ncep.noaa.gov/dailywxmap/index_20190829.html.
2. University of Wyoming College of Engineering. (2019, August 30). Atmospheric Soundings. Retrieved October 28, 2019, from http://weather.uwyo.edu/upperair/sounding.html.