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MCEN 4151

Professor Hertzberg

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Cloud Second

Figure 1: Mountain wave cloud over the flatirons. Taken while walking past the C4C at 12:30 pm on 4/9/18.

Introduction

The purpose of this picture was to capture an aesthetically please image of a cloud that also illustrated the atmospheric flow on a grand scale. Using data from outside sources that show the atmospheric conditions around the time of the photo we can perform an in-depth analysis of the cloud phenomenon at the time the image was captured. I liked the clouds coming over the top of the flatirons and took a few pictures of these clouds. Once I had the pictures I cropped out the street lights and other man-made structures. I also increased the brightness and the contrast of the image to bring out the white in the clouds. The final image was a cloud that was approximately 30˚.

Image Circumstances

This image was taken outside of the Center for Community (C4C) on the University of Colorado Boulder's campus. The cloud was moving west to east over the flatirons. The image was taken on Monday, April, 9 2018, at approximately 12:30 pm.

Cloud Type

I believe the cloud in the image was a mountain wave cloud that was just cresting the top of the flatirons at the time of the picture. The rest of the sky had thick puffy clouds above the flatirons as well. There was a breeze that day, but it was not a strong breeze, as well as being a fairly clear and sunny day. The skew-T diagram from that day indicated a CAPE that was 27.92. This means that the atmosphere was unstable and that air an air parcel that moved upward would continue to move upward because it would continue to be heated.

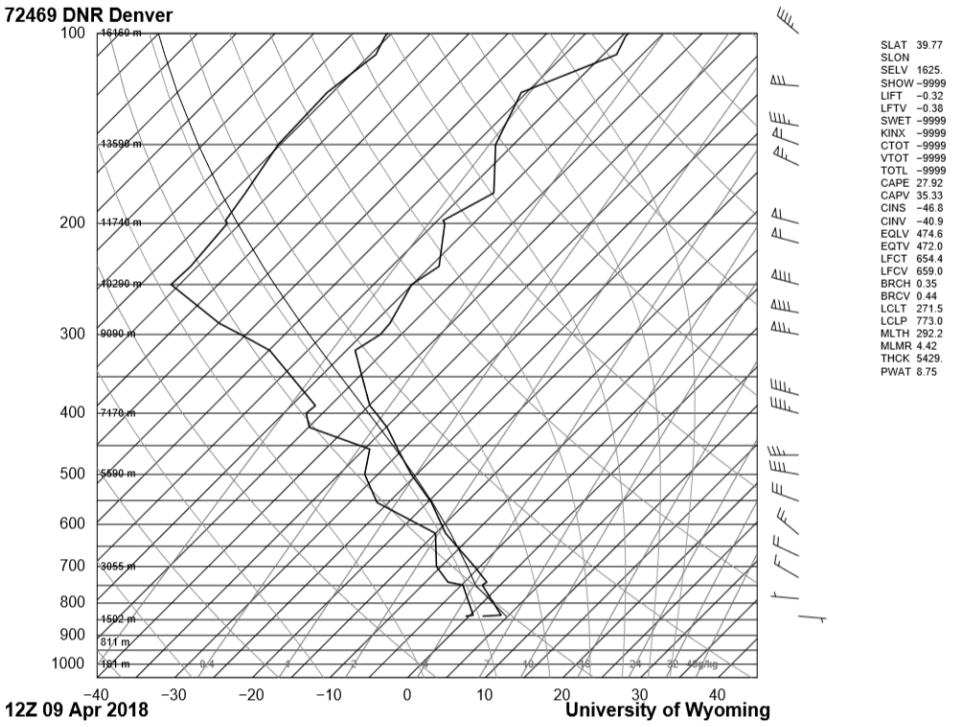

Figure 2: Skew-T diagram from the day the image was taken (4/9 12Z)

Also looking at the ceilometer data collected by CU Boulder on the day that the image was captured we see that the cloud ceiling was around 3 km (9843 ft above ground level). The data from the skew-T diagram and the ceilometer, and the way that the cloud seemed to be coming up over the top of the flatirons at a relatively low altitude led me to the conclusion that this was a mountain wave cloud.

Photographic Technique

The approximate distance from the cloud to the lens of my camera was 19,686 ft. This number was found by using the approximate height of the cloud as well as the approximate angle from the horizon and using the trigonometric function sine, where x is the distance from the cloud to the lens of the camera.

$$\mathrm{Sin}(30) = \frac{9843}{x}$$

$$x = \frac{9843}{\sin(30)}$$

$$x = 19{,}686\ ft.$$

The image was taken using my iPhone 6s. The image is 3024 x 2129 pixels. During post-processing I cropped out the man-made structures that were in the photo such as street lights and houses as well as some larger clouds at the top of the image that I felt were distracting. I also increased the brightness of the image as well as the contrast to make the whites brighter and the darker sections of the cloud darker and slightly more ominous. All this post processing was done using the Gimp software. Below is the original unedited image.

Figure 3: Original, unedited image.

Conclusion

I like this image but there are some things that I would like to do differently given the chance. I would like to take this with my Sony DSLR-A300 rather than my phone as I think that my phone camera didn't give me the amount of detail that I would have liked. I would also like to take a picture like this from a slightly different vantage point so that I can get more of the flatirons in the picture rather than having to crop them out to avoid the man-made buildings and street lights. I did like the overall idea of the image by looking back I think the execution left a little to be desired.