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Clouds First Report
MCEN 4151 Flow Visualization
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Clouds First Report

The Clouds First assignment is designed to allow students to capture images or videos of clouds and research the science behind them. It is a great opportunity to learn more about the formation of clouds and their types. For this image, my intent was to capture a giant cloud on a possible rainy day, so the cloud has different layers of brighter and darker colors. To do so, I captured multiple images of clouds over a month and a half and recorded the days when it rained.

This image was taken on the afternoon of September 10, 2019, at 3:02 pm. While waiting inside the Integrated Teaching & Learning Laboratory (ITLL) building, I decided to walk out by the parking lot and look up to the sky to take pictures of clouds. The exact location was $40^{\circ} 00' 24.2''$ N $105^{\circ} 15' 42.2''$ W. The figure below shows the location on Google Maps. The elevation at this location is approximately 5370 ft., and the angle from horizontal at which the image was taken was about 60° .



Figure 1. Shows the location where the image was taken [1].

Based on the Weather Underground website, the temperature varied on this day from 59F to 84F with an average temperature of 71.74F. The exact temperature when this image was taken was about 79F. Moreover, the maximum wind speed on this day was 13mph. However, most of the day was calm and steady, and the wind speed when the image was taken was about 5mph. Regarding rain and snow on this day, it rained around 1:33 am, and again about 2 hours after this image was shot with thunder as well. However, it did not snow at all [2]. The clouds shown in the image were cumulonimbus. The atmosphere at which these clouds were in was unstable. This is demonstrated in the Skew-T diagram shown below as the convective available potential energy (CAPE) value was not zero. In fact, it was 1307. The roughly estimated elevation of the clouds in this image is between 1500 – 2000 m. On another day, it is expected to see cumulus clouds at 1600 m, altocumulus clouds at 6400 m, and cirrocumulus at 9500 m. I think the type of cloud observed in this image is reasonable since cumulonimbus clouds can form in the range of 1600 m to 12000 m.

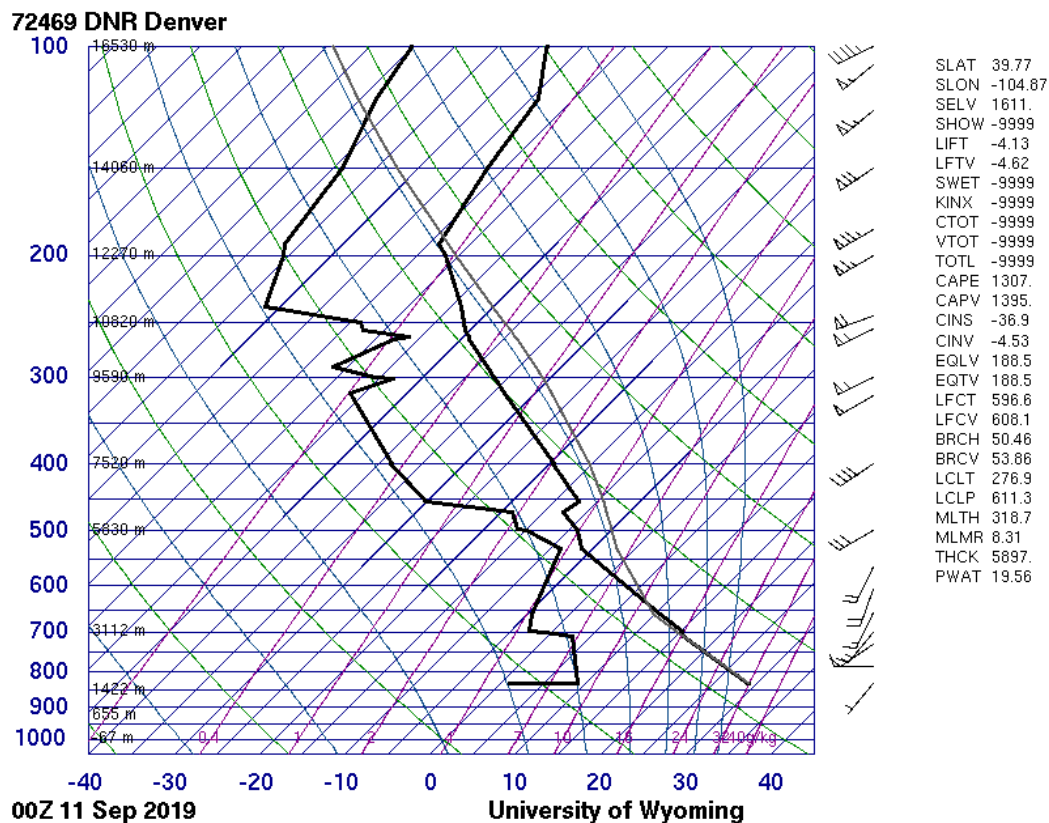


Figure 2. Skew-T Diagram at 6:00pm on September 10, 2019.

This image was taken using my iPhone 8 Plus which has a dual 12-megapixel camera. This phone does not allow the user to adjust many features as other recent phones do. Therefore, what I did when taking the picture was adjusting the focus manually on the clouds to get a clear and sharp image. From the metadata, this image was taken with the following settings: aperture F/1.8, exposure 1/6897, and ISO 25. The focal length of the lens in this phone is 4 mm. The size of this image is 4032 x 3024. Based on my estimations, the distance to the object is about 5000 ft. Finally, no editing was done regarding the highlight and contrast of the image. The reason why I did not edit it was that the original image shows a variety of colors and brightness that I wanted to keep. However, I cropped the image from the bottom to get rid of a thin branch of a tree that was in the bottom right of the original image.



Figure 3. Shows the original image.



Figure 3. Shows the edited image.

In conclusion, the image shows great details about the clouds. I like how this image shows the dark cloud on the left and a bit of a brighter cloud on the right. Also, I find it interesting that the middle of the image shows the sky as a stream of water. I think that the fluid physics are clearly shown as well, and it is easy to name what type of clouds these are. In short, I am very happy with my image for this Clouds First assignment.

References

- [1] Google. (n.d.). Retrieved from [https://www.google.com/maps/place/40°00'24.2"N+105°15'42.2"W/@40.0067222,-105.2639109,17z/data=!3m1!4m5!3m4!1s0x0:0x0!8m2!3d40.0067222!4d-105.2617222?hl=en](https://www.google.com/maps/place/40°00'24.2).
- [2] Loveland, CO History. (n.d.). Retrieved from <https://www.wunderground.com/history/daily/us/co/boulder/KFNL/date/2019-9-10>.