

Cloud First Image Report
MCEN 4151
Branden Goldenberg



Figure 1: Final Cloud Image

Introduction:

For the past few months now, I have been scanning the sky for interesting cloud phenomena that are not in the everyday skies of Colorado. Depending on factors such as altitude, moisture content of the air, and the stability of the atmosphere, clouds can form in an infinite amount of shapes and sizes. For the first of two cloud image assignments, a cloud that takes a unique form is and displayed above in Figure 1. It is always fascinating to look into the sky and see shapes that look familiar, this cloud, is unmistakably a face shape. With the big mouth, the perfect eye sockets, and the hallow looking inside, this cloud takes on the appearance of the Sorting Hat, from Harry Potter.

Time:

This image was taken in South Boulder, on October 4th looking upwards at about 30 degrees from horizontal. The time was roughly 7:30 pm, as the sun was almost completely beyond the horizon. Although it was nearly dark outside, a long shutter speed allowed for enough light capture for the image. On the ground, at an elevation of roughly 1600 meters the air was calm, but the motion of the clouds suggested a slight wind at higher elevations.

The Cloud:

The weather for the days surrounding the image was fairly calm. No major rains, or storms for the two days before and after the image was taken, leading me to believe the atmosphere was relatively stable during the time of the photograph. With a cloud elevation of roughly 3000-3500 meters from the ground surface it is a relatively low cloud. The cloud was not extremely dense and there were a few other patches of similar clouds in the vicinity. Also Stratocumulus clouds sometimes are not very dense and tend to occur in layers or patches as seen above in Figure 1. Shown below in Figure 2, is the Skew-T plot for the night of the photograph. At roughly the elevation of the cloud, there is a soft wind in the western direction. The CAPE value being zero also suggests a fairly stable atmosphere, leading me to believe it is a stratocumulus cloud. Cumulus, meaning joined together, are caused by an inversion, a stable layer that stops upward convection. Stratus, meaning broken up, the top reflects light and cools while the bottom absorbs IR light from the earth, and warms. Cool on top and warm on the bottom leads to instability thus causing the air to want to turn over, breaking up stratus layer causing the unique uplift of the cloud from the inside and creating the hallow pocket of the cloud.

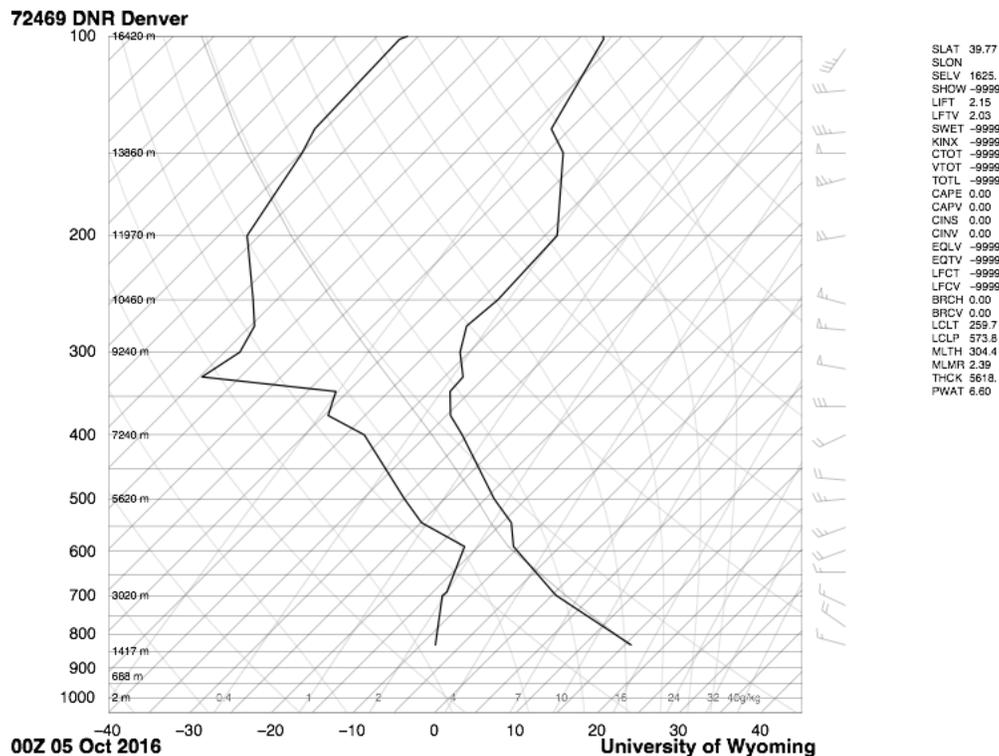


Figure 2: Skew-T plot for DIA on Oct. 4th, 6pm

The Camera:

Using a Panasonic DMC-ZS50, digital camera to obtain the image displayed below in Figure 3 was rather difficult. Because of the time of day, the amount of sun light available to photograph was low and the lower resolution of the camera made it difficult to get a crisp photograph. Clouds are also always in motion, changing and developing over time, this motion causes an undesired blur to the cloud image. To compensate for the low amount of light and the motion, an ISO of 1600, f-stop of 4.4, a shutter speed of 1/4 second, and a tripod were utilized to obtain a clear photograph with minimal blurring effects. The original image shown in Figure 3 was edited using Gimp. The image was cropped and curve was shifted to enhance the contrast between the shapes in the cloud, resulting in a final image shown in Figure 1. According to my height and camera angle estimations, the cloud was roughly 6000 meters away and roughly 500-1000 meters in diameter. Giving a rough field of view of 800-1500 meters horizontally and pixel dimensions of 4000 X 3000.



Figure 3: Original Cloud Image

Conclusion:

The image shows some interesting cloud physics. The cloud was likely a cumulus cloud that developed an instability because of its opacity and turned into a stratocumulus. It has an interesting shape, but I wish there was more light. Although the intent was fulfilled in capturing a cloud resembling something familiar in day to day life, this cloud an hour earlier in the day would have been more ideal. Capturing a group of recognizable figure would be unlikely, but could have an amazing photographic appeal. For cloud image two I would like to capture a cloud phenomenon on a more grand scale.

Citations:

Skew-T:

Oolman, Larry. "Atmospheric Soundings." *Atmospheric Soundings*. University of Wyoming, 05 Oct. 2016. Web. 06 Nov. 2016.

<<http://weather.uwyo.edu/upperair/sounding.html>>.

Cloud information:

Met Office. "CL5 Stratocumulus Not from the Spreading of Cumulus." *Cloud Types for Observers*. London: H.M.S.O., 1982. pg. 10. *Cloud Types for Observers*. Met Office, 2006. Web. 06 Nov. 2016.

<http://www.metoffice.gov.uk/media/pdf/r/i/Cloud_types_for_observers.pdf>.