

Stefan Schultz

Flow Visualization

**Project 2: Clouds 1**



The purpose of this image was to highlight the interesting and dynamic fluid mechanics in clouds that we typically take for granted. It was my intent with this image to capture a less common cloud phenomenon. There are many clouds that we see on a day to day basis and have become generally less interesting because of their common appearance. Although the segmented altocumulus formation that I photographed may not be the most unique cloud, it's still not your average everyday cloud. Many other photographs were taken of a variety of cloud formations but none were particularly interesting or turned out to be a clear image.

The image I selected was taken at about 5:30PM on September 22, 2015 in Boulder, Colorado, about one mile west of the CU campus. The image was take facing west at nearly ninety degrees above the horizon.

The clouds shown in the image were part of a large area of segmented altocumulus clouds. The particular formation in this image could be considered an altocumulus undulatus. These cloud formations typically have the look of waves or water ripples and are a result of shear winds. This is cohesive with the information shown in the skew-t as there were moderate winds at the altitudes of this formation. This layer of clouds was formed in an unstable region of the atmosphere between 4000m and 7000m, an average altitude for altocumulus formations. This is information confirmed by the 6PM skew-T diagram out of DIA shown here:

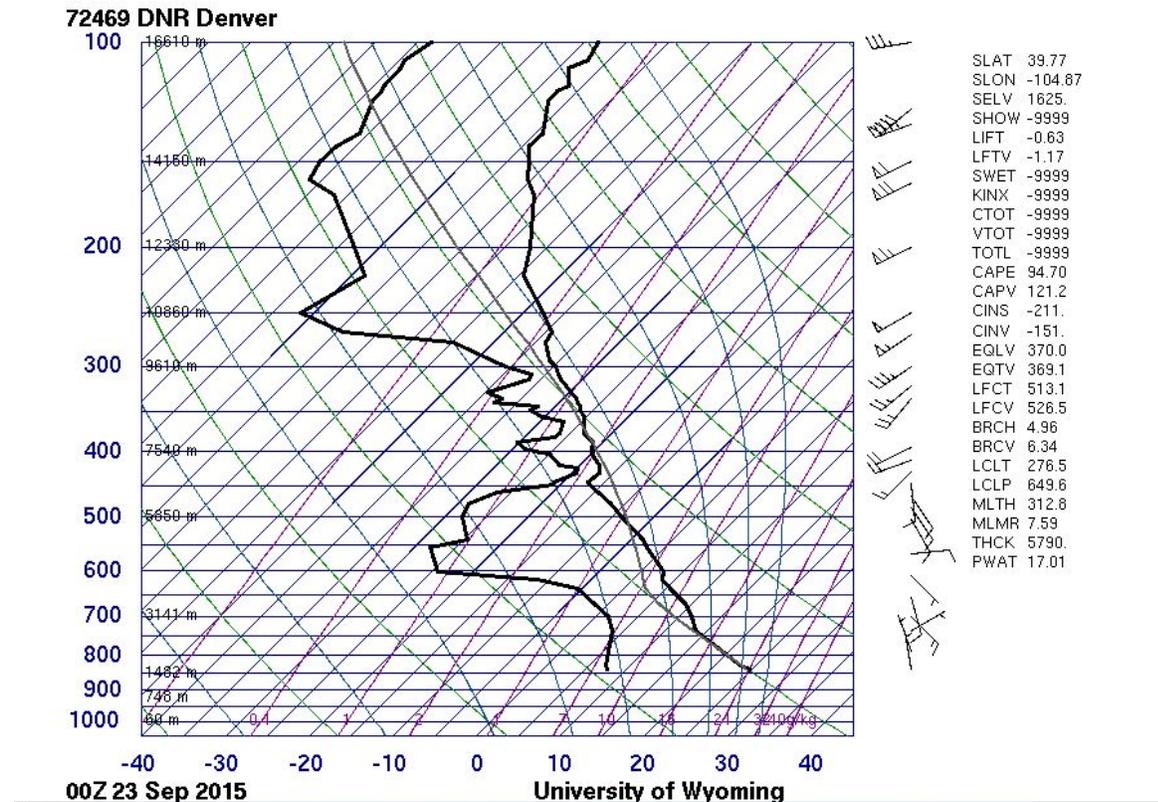


Figure 1: Skew-T for 9/22. Retrieved from University of Wyoming Department of Atmospheric Research <http://weather.uwyo.edu/upperair/sounding.html>

At the time of the image, the sky was mostly covered by clouds. However, no storm was active on the day of the image, which makes sense with the relatively low CAPE expressed on the skew-T. This large area of clouds was likely on the leading edge of a front though, because over the following few days we received fairly consistent cloud coverage and rain. The segmented formation of the altocumulus could be caused by wind shear, a large sudden change in the wind's speed and direction in that area of the atmosphere, pulling the local clouds apart into different pieces.

This image was taken on a Nikon D90 DSLR camera with a standard lens. The image was shot with a 1/2500 shutter speed, at an aperture of F25, and an ISO of 3200. The focal length of the lens for the image was 34mm. The original image had dimensions of 4288x2848 pixels. The final image was cropped down to 3568x2848. For post processing, curves were applied to add contrast between the lighter and darker segments of the clouds as they were much more similar in the original image. An unsharp mask was then applied to help better define the edges of the clouds and the separation they exhibit. No other processing was done on the image. All image editing was done in Photoshop.



Figure 2: original unedited image

Overall, I believe I have captured an interesting cloud image that does not feel entirely generic. However, I feel like the image is a clear demonstration of some uncommon cloud behavior, but didn't turn out being particularly unique or enthralling. The high ISO for the image left some grainy artifacts that made the image a little difficult to work with in post processing. I also think that the lack of color, either in the foreground or the sky behind the clouds, takes away a sense of depth that would potentially add something a little more dynamic to the image. The inclusion of the trees in the foreground was included to make up for this. Originally, the edited image was just of the clouds and was

dull to look at and gave no sense of size or distance. To improve for the next cloud image, I intend to shoot from a better vantage point, either up high on a mountain or in a much wider open space free from obstructions such as trees overhead or buildings blocking the view of a full cloud. This project highlighted some of these issues. I was shooting from in the middle of the road outside of my apartment since I had seen the clouds on my way home and didn't think I would have time to go somewhere else and still be able to capture the same cloud I wanted to photograph.