Clouds 1
MCEN 4228: Flow Visualization
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When it comes to observing flow visualization, one of our best methods occurs naturally right above our heads. Clouds hold a wealth of information which can help explain what the current atmospheric conditions might be and what the driving physics behind the myriad cloud types are. From my collection of cloud photos produced over the allotted time period, I finally settled on cluster of cirrus clouds with an optical phenomenon reminiscent of a rainbow. I feel that this photo fulfilled my intentions of producing a unique cloud formation, yet still had an artistic sense.

My image was taken during the evening of October 9th, 2007 in southeast Boulder, Colorado. I tried to take most of my pictures either during the early morning or early evening so that the atmospheric conditions present would most closely match that of the sounding data

collected at the Denver weather-balloon site. The sun had just dipped behind the flat irons which really highlighted and nicely backlit the cirrus clouds that were of interest to me. Cirrus clouds are the most common type of high altitude clouds. They most typically form at elevations greater than 6000 meters and are the result of ice crystals formed by supercooled water droplets. Usually they form under fair atmospheric condition as well. According to the skew-T plot shown in Figure 1, the observations made seem to agree with the sounding data. The elevation at which cirrus clouds form show a neutrally stable atmosphere since the slopes of the adiabatic and temperature curves are relatively the same. The direction of the wind (NW to SE) also seems to agree with the how the cirrus clouds are aligned in the sky.

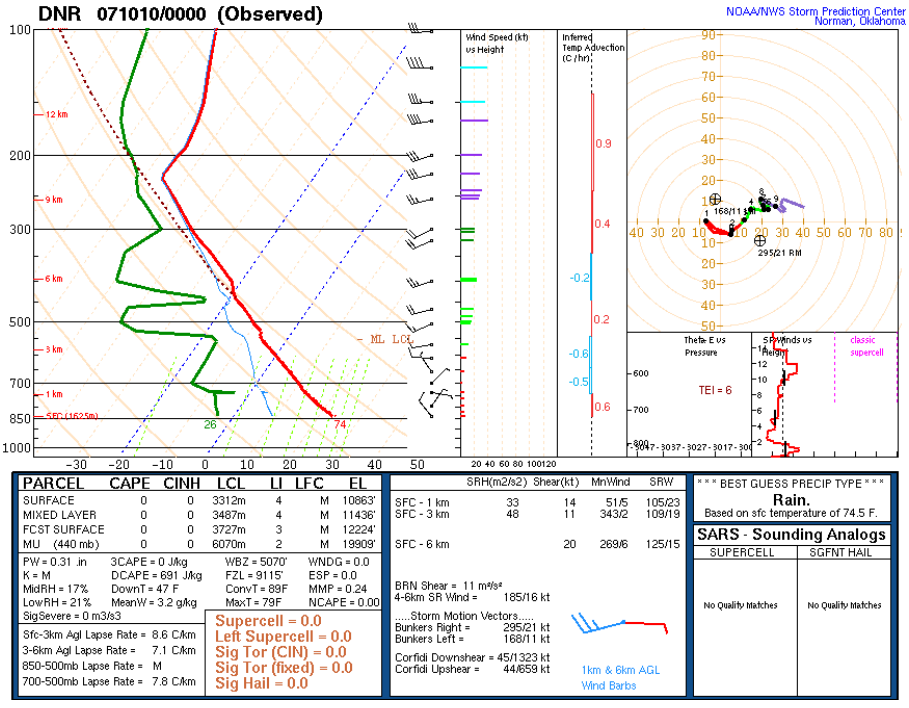

Figure 1: Sounding Data Skew-T Plot

All of the important image properties can be seen in Table 1. Using the mountains as a reference height it was estimated that the field of view was 2 km by 2 km. All other settings were automatically chosen by my cameras outdoor setting. That said, my photographic

technique was relatively straightforward; simply a point and shoot process. The automatic outdoor feature seemed to produce quality pictures. The Photoshop techniques applied to this photo were an adjustment to the contrast, touchup of some lens spots using the clone stamp tool, and a cropping of the most interesting elements. A final image size is 2048 by 2048 pixels. The adjustment in contrast really helped bring out the rainbow like optical effect.

Table 1: Image Properties

Photographic Technique	Value
Size of field of view	2 km by 2 km
Lens focal length	55 mm
Type of Camera	Canon EOS Digital Rebel (6.3 megapixel)
Aperture	f/13
Shutter speed	1/320sec
ISO setting	100

I personally like the thin, wisp-like quality of cirrus clouds and I think that my picture nicely portrays this. One of my goals for this assignment was to keep a lookout for clouds that produced a halo effect. Although the optical effect present in my picture isn't really technically a halo, I feel it still adds a nice dimension to the picture. The silhouetted flatirons in the foreground also add a sense of scale which is nice. In the future, I would like to more focus on clouds that display a specific physics phenomenon such as Kelvin Helmholtz clouds.

1: "Storm Prediction Center." NOAA. October 9, 2007.
http://www.spc.noaa.gov/exper/soundings/