

Clouds First

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ATLS 4151 - Flow Visualization

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I. Title

October Surge

A stratocumulus cloud taken at sunset 6:28 pm October 17th, atop my room looking west toward the flatirons of Boulder CO.

II. Purpose/Context

Clouds First

An assignment to observe, visually capture, and document clouds with a goal to explain the scientific and photographic process behind the artistic beauty within them. This is our first cloud assignment of the year for our Flow Visualization course at CU Boulder. This report will provide a strong focus on the photographic techniques used during my process as well as the science behind the formation of the cloud.

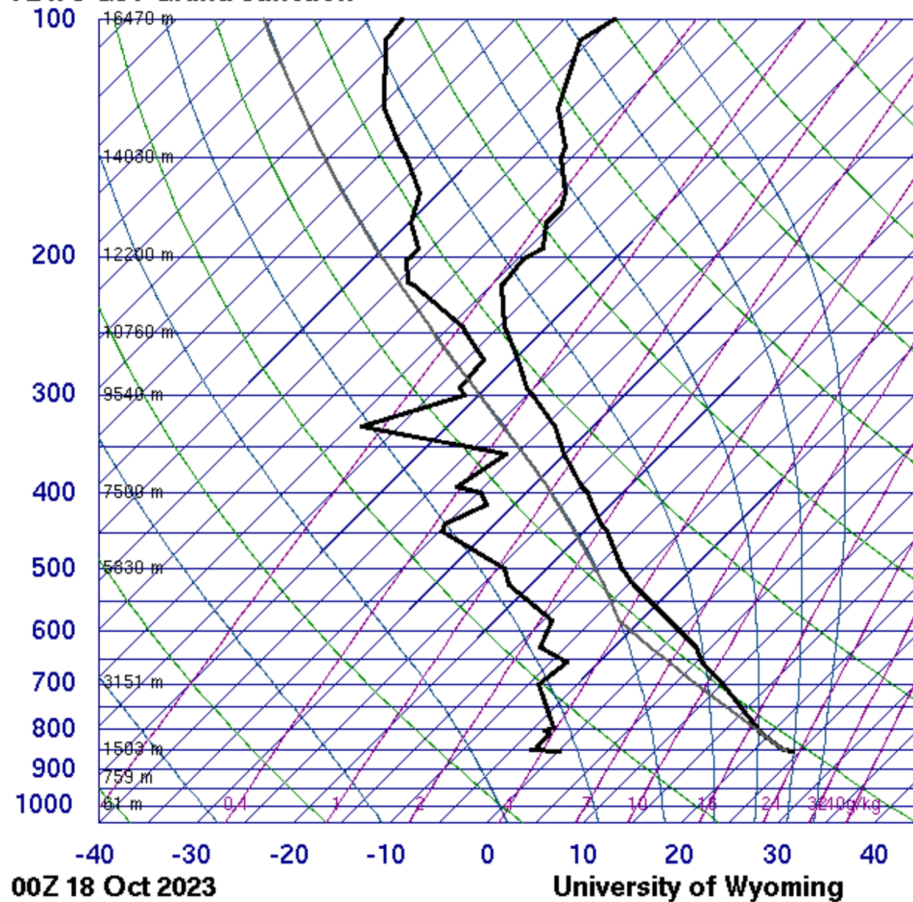
III. Circumstances/Environment

Location/Conditions

This picture was taken about 10 blocks east of the base of the Chautauqua trailhead in Boulder Colorado. The weather was relatively calm this afternoon, about 73°F, wind blowing from the northeast at about 5.8mph, and about 30% humidity. We can further examine the specifics of the weather conditions by looking at a skew-T chart made at the Grand Junction station at the time. A skew-T log-P diagram is one of four thermodynamic diagrams commonly used in weather analysis and forecasting. This information is provided by the Department of Atmospheric Science of the University of Wyoming.

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

72476 GJT Grand Junction



SLAT	39.11
SLON	-108.53
SELV	1475.
SHOW	2.92
LIFT	2.61
LFTV	2.40
SWET	40.02
KINX	13.70
CTOT	9.50
VTOT	35.50
TOTL	45.00
CAPE	0.00
CAPV	0.00
CINS	0.00
CINV	0.00
EQLV	-9999
EQTV	-9999
LFCT	-9999
LFCV	-9999
BRCH	0.00
BRCV	0.00
LCLT	265.8
LCLP	580.6
LCLE	322.8
MLTH	310.5
MLMR	3.84
THCK	5769.
PWAT	11.08

Skew-T

Now, a skew-T chart is not very intuitive at all and will require some explaining in order to understand what information we can take away from this. This information is recorded using radiosonde balloons, which ascend into the atmosphere and record the temperature and relative humidity at certain prescribed pressure levels and anytime significant change occurs in the temperature, humidity, or wind. The two black lines indicate the dewpoint and the temperature (left to right respectively).

Dew Point is the atmospheric temperature (varying according to pressure and humidity) below which water droplets begin to condense and dew can form.

At each level on the Skew-T, the closer the dew point is to the temperature, the higher the relative humidity is at that level. The dew point will occasionally equal the air temperature, which is indicated by the intersection of both lines.

The gray line that begins at the bottom of the temperature line is our example parcel of air, moving up through the chart as if it were an imaginary box of air floating upwards adiabatically (occurring without loss or gain of heat).

Takeaways from Diagram

To put things simply, when this line intersects the temperature line, or the temperature line inverts (moves right instead of left), or the dewpoint and temperature are very close or overlap, this is an indication that a cloud is likely to form at this altitude. The altitudes where this occurs on this chart are at about 2,327m, 8,520m, and about 10,000m. Because of how close the cloud seems to be to the mountains, I have inferred that this was a relatively low altitude cloud, and given these choices for possible altitudes, I have deduced that this cloud was likely close to ~2,300m high in altitude.

Given this information I am also able to identify this cloud as a *stratocumulus*. As the most common type of cloud in the world, this cloud is identified as low-altitude-level and clumpy with varying levels of density that make for many different reflective layers that give a large assortment of colors.

IV. Photographic Technique

Position

When I took this picture, I was sitting atop my roof just south of Boulder's campus facing west toward the mountains. There was a relatively open clearing through the trees and I moved myself as far over to my left as possible without falling off the roof to frame the spiraling cloud neatly.

Settings

The camera I used for this photo is a Nikon COOLPIX P900 I inherited from my Grandpop. The settings I used for this photo were as follows:

F-stop - f/2.8
Exposure time - 1/50 sec.
ISO - 100
Focal Length - 4 mm
Max Aperture - 2.9
35 mm Focal Length - 24

Editing

The software I used to edit this picture was Lightroom Classic. I didn't really have to do any cropping for this photo, just color composition stuff and intensity changes for brighter and darker colors. I think that for this particular image, because the trees are actively framing the cloud and aren't as central of a subject as the cloud is, it was an appropriate decision to black them out. I accentuated the orange and red colors in the cloud to make it more visually captivating. Not much editing on this photo really.

Edited



Original



V. Revelations

This cloud reveals a slight vortexing effect, with a clear center and a moving motion shaping almost into a nautilus. The colors of the cloud also depict varying ranges of height, cloud density, and reflectivity. I chose this cloud because it was the most mysterious and dramatic of all those I had captured this period.

Deciding which cloud I wanted to include in my report was very difficult, I saw a lot of really awe inspiring clouds and had a great time editing them together and making some really cool images. I chose this cloud because I liked how the colors of the sunset reflecting off it complimented the fall colors during this period.

I think that for my next cloud assignment I would like to do a set time lapse video rather than a single photo. This would help me to more clearly see the movement in the clouds flow. I've also been wanting to do a rotoscope-like animation of clouds and this would be a wonderful way to start that. I think that my camera settings were okay for this particular cloud, the settings were set for a lighter scenario at the time and I didn't have much time to fidget with the settings before the cloud quickly lost its color and shape.