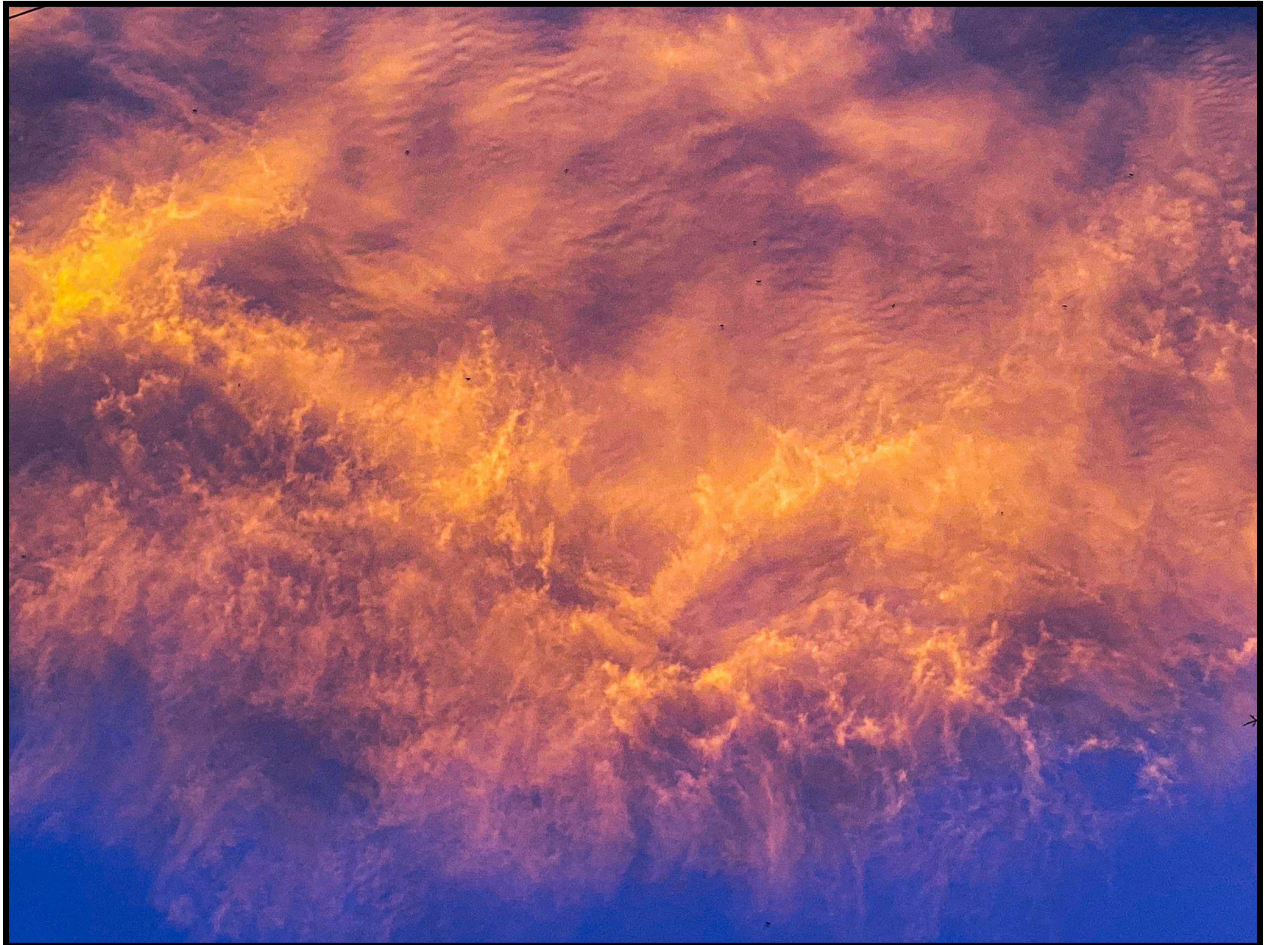


Clouds Second

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ATLS 4151 - Flow Visualization

12/11/2023



I. Title

Wispy Waves

An altostratus cloud taken at sunrise, 7:30 am November 1, 2023, looking straight up toward the sky in the parking lot behind my house.

II. Purpose

Clouds Second

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 second 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

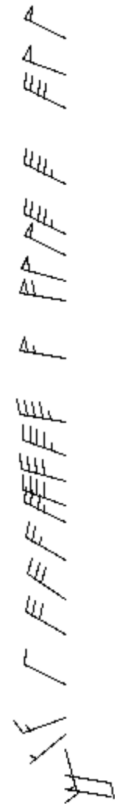
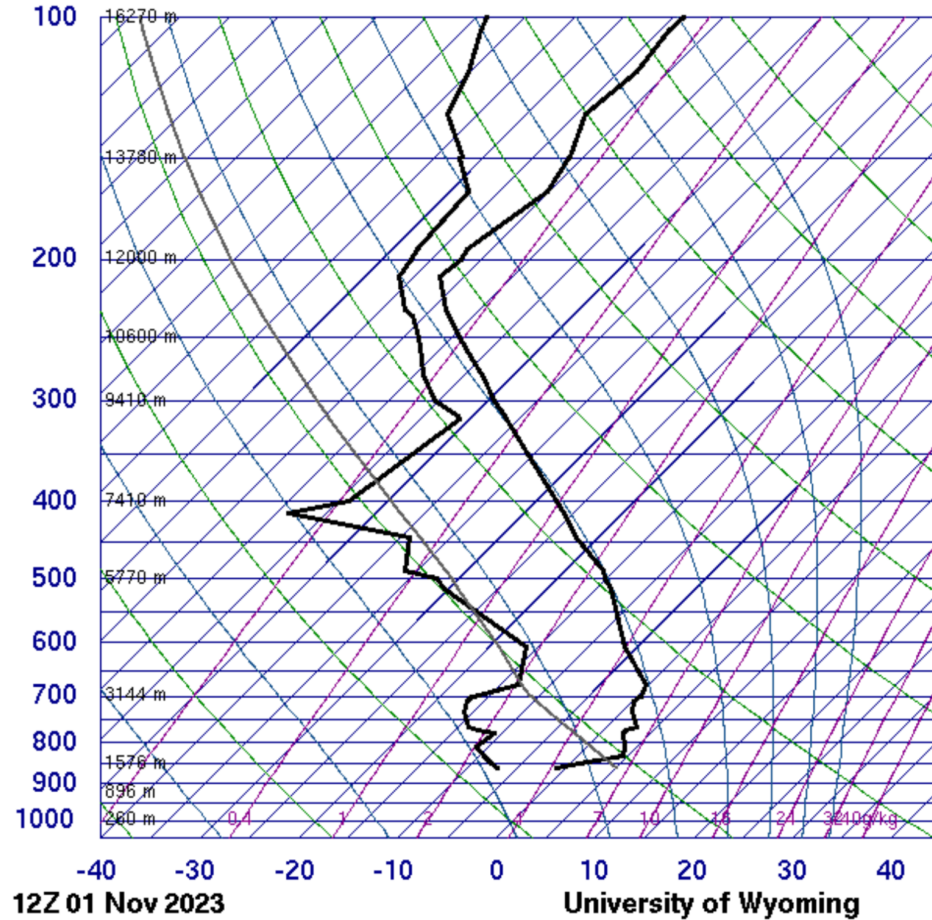
Location/Conditions

This picture was taken facing straight up towards the sky, about 10 blocks east of the base of the Chautauqua trailhead in Boulder Colorado. The weather was very calm this morning and these clouds were covering most of the sky over Boulder between about 6:50 and 7:50 am. It was about 37°F, the wind was blowing from the west at about 3.6 mph, and about 68% 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>

Skew-T

72476 GJT Grand Junction



SLAT	39.11
SLON	-108.53
SELV	1475.
SHOW	17.74
LIFT	15.59
LFTV	15.58
SWET	51.98
KINX	-8.90
CTOT	7.10
VTOT	16.10
TOTL	23.20
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	261.6
LCLP	692.7
LCLE	297.5
MLTH	290.5
MLMR	2.31
THCK	5510.
PWAT	6.59

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 dew point 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 (the gray line) intersects the temperature line (black line on the right), 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 2,208m, 3,200m, 9,000m. From these images and the information from the Skew- T, I am able to deduce that these clouds were likely between the altitudes 2,208m and 3,200m. Given this information I am also able to identify this cloud as an *altostratus*. Altostratus clouds are known to cover large portions of the sky at mid-high altitudes and are relatively flat. While my featured image may not look particularly flat, please take a look at this other capture of a larger portion of the sky.



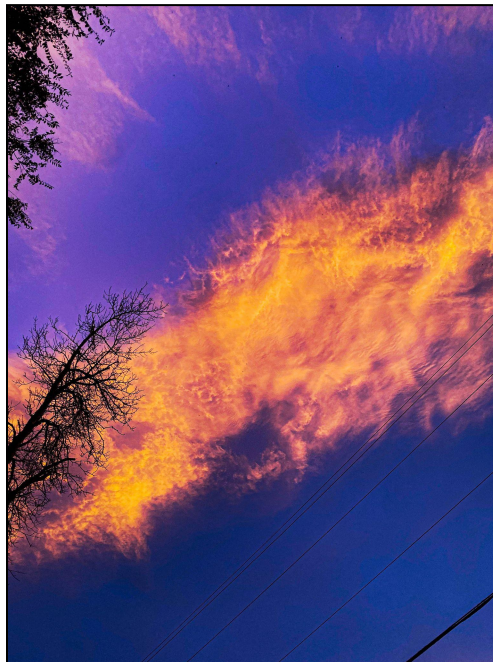
Unedited full sky image

You will see that the clouds cover most of the sky, but only some sections are illuminated by the sunrise. Since these clouds were coming from the east (with an easterly wind of 3.6 mph) they were running into the mountains, which caused them to rise and change their vertical direction.

IV. Photographic Technique

Position

When I took this photo I was placed in the parking lot behind my house. It's surrounded by other houses and trees so the only vantage point to the sky is straight up, which was convenient since the cloud I wanted to capture was directly above me. I have another photo that shows more about my position below.



Edited perspective image

Settings

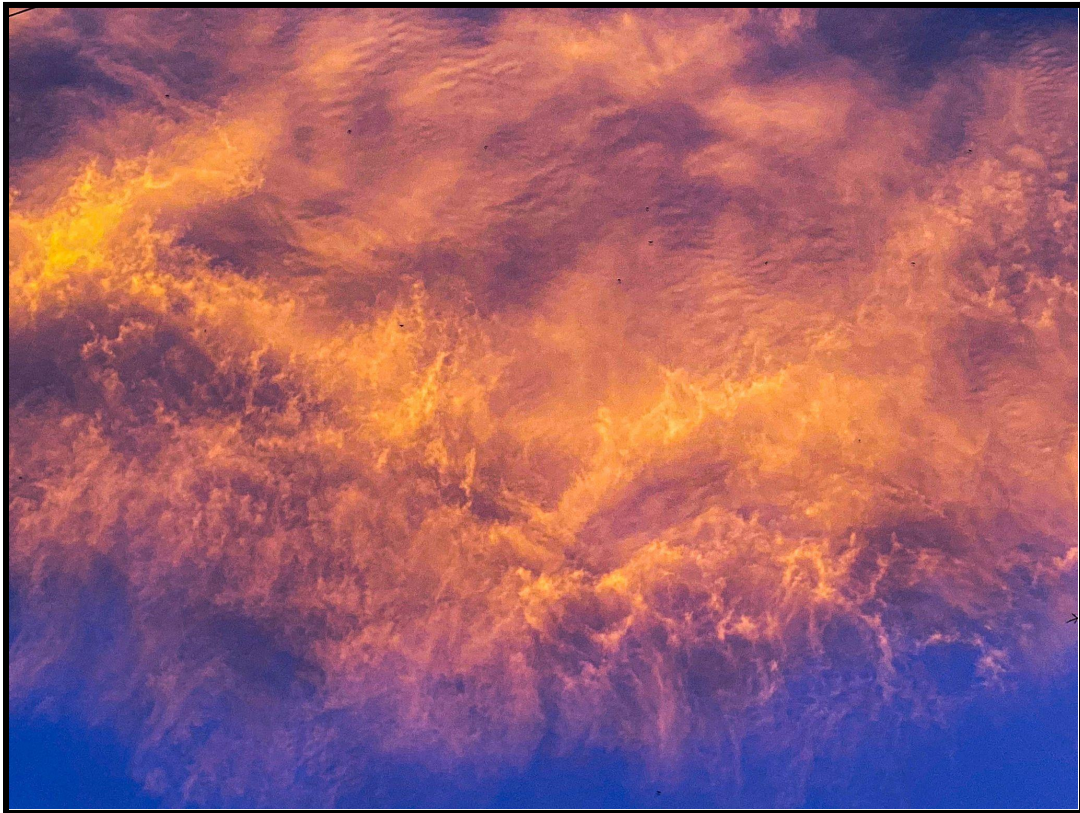
The camera I used for this photo is a Nikon COOLPIX P900 I inherited from my Grandpop. The settings I used for this photo were as follows:

F-stop - f/1.8
Exposure time - 1/120 sec.
ISO - 100
Focal Length - 4 mm
35 mm Focal Length - 58

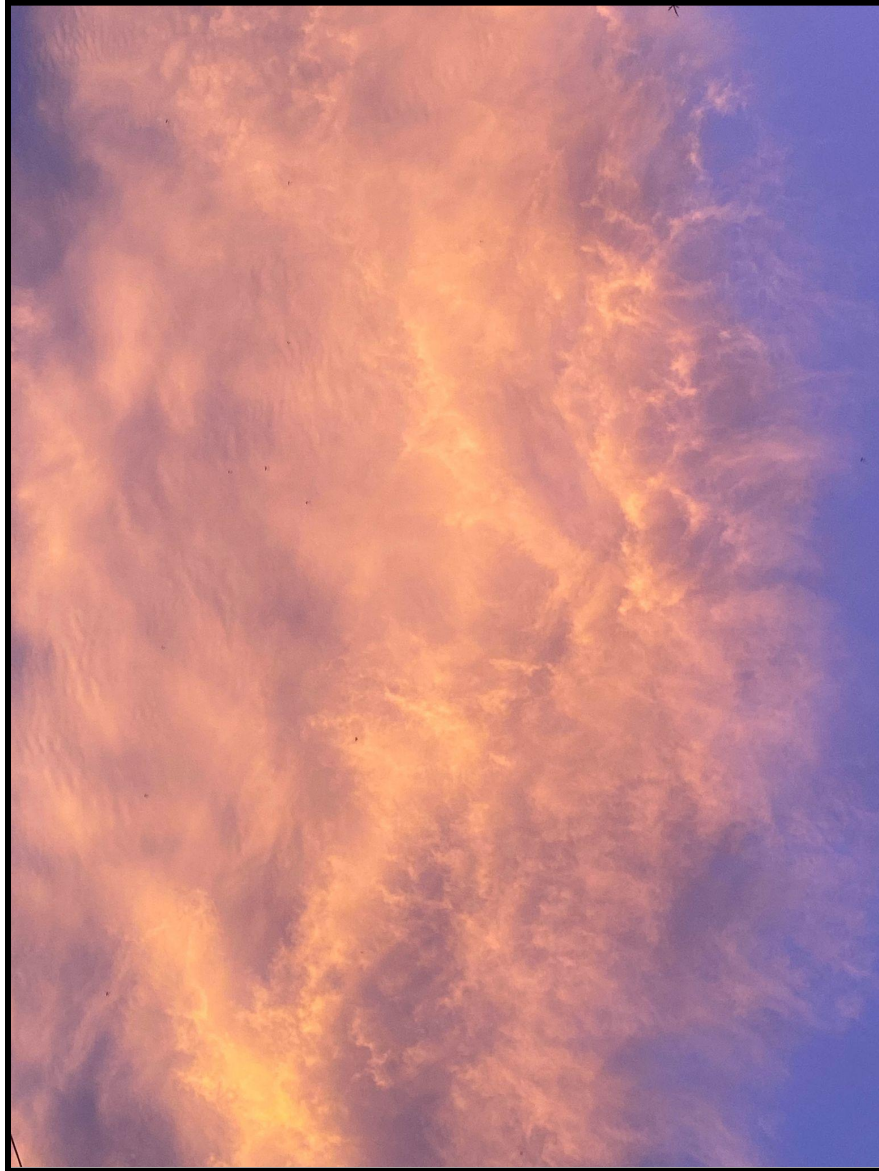
Editing

The software I used to edit this picture was Lightroom Classic. I rotated the image to frame it better to make it look like crashing waves on a beach. After this, I played with the texture, clarity, and dehaze as well as shadows, whites, and blacks. This helps the features of the cloud pop more and separates some of the breaks in the cloud more.

Edited - 4032 X 3024 pixels



Unedited - 3024 x 4032 pixels



V. Image Revelations / Self Assessment

I honestly wish I had my camera earlier in the morning, some of these pictures were captured on my phone. The only reason I was up so early was because I was driving my girlfriend Crista to the airport. Odd, random chance that I was able to experience this sunrise, I'm very thankful for it. Overall, I'm very happy with these pictures. I've really enjoyed these cloud assignments and I've loved this class so much as well. I keep recommending it to my friends and I couldn't be more glad that I decided to take this class.