# Clouds 2 Report:

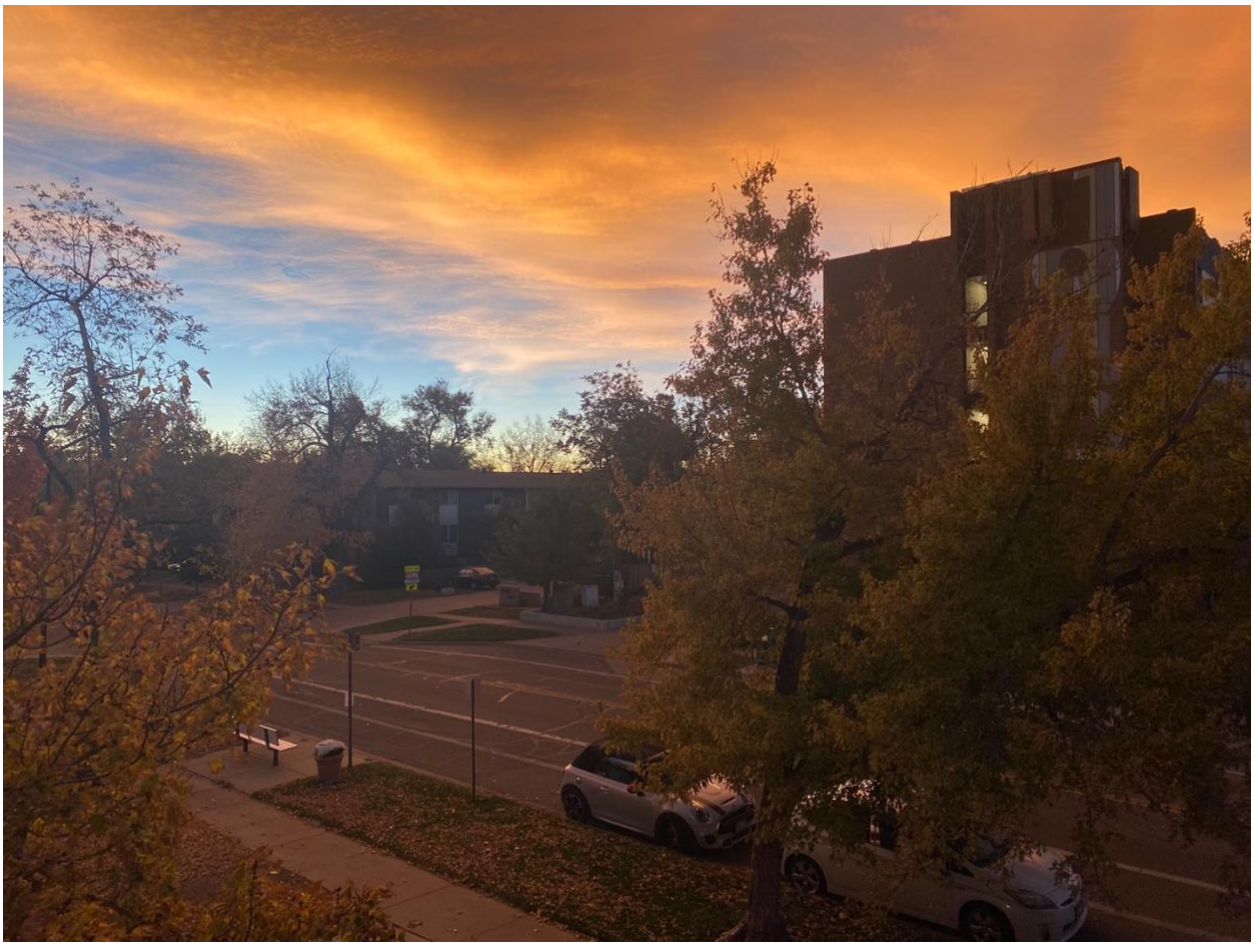

*Photo taken in Boulder, Colorado*

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Photo Information:

| | |
|---|---|
| Taken on: | 10/25/2022 |
| Type of Cloud: | --- |
| Time of photo: | 7:00 AM |
| Location of photo: | Downtown Boulder, CO |
| Direction of camera and distance to cloud: | ~15°, ~100’ |

## Introduction:

This is a report for the second Clouds assignment for Flow Visualization. As in the first Clouds assignment, this report will detail the documentation of a cloud event, and the likely environmental flow occurrences required to produce such a cloud. Claims will be supported by a Skew-T diagram, which is a composite diagram that documents atmospheric conditions in Grand Junction, Colorado on the day this photo was taken. The photo found in the report is the result of several weeks of random cloud documentation.

## Documentation Process:

This photo was from a cohort of potential candidates. The photo was taken spontaneously on the balcony of my apartment in Downtown Boulder, Colorado. I took the photo at dawn, as I left for campus that morning. I was struck by not only the color of the clouds as well as their formation in the sky. I took this at the elevation of Boulder City, around 5,000'. Additionally, the clouds in the shot site around 10° above the horizon line of the camera, and approximately 100' in the distance.

## Cloud Characteristics:

Based on the information delivered in Lectures 12 and 13, I believe the clouds shown in this photo are cirrus, cirrostratus, stratus formations. The formation in the right half of the screen has a high opacity, and appears to muddle the colors of the dawn sun with the darker western sky. This formation displays the characteristics of a stratus cloud. The clouds in this photo transition from the stratus formation, on the right side of the image, to a cirrus formation and eventually clear sky, on the right side of the image. The entire formation transitions from stratus to cirrus. It is therefore my belief that in the transitional domain there is an area with cirrostratus formations.

The following paragraph is source from my Clouds 1 report, and speaks to the nature of the Skew-T diagram. Found below, in Figure 1, is the Skew-T diagram produced by the University of Wyoming, from Grand Junction, Colorado. The Skew-T diagram below shows where clouds reasonably could lie based on a set of parameters. For this particular Skew-T, we can estimate the approximate altitude location of the clouds and the wind speed and direction. As an aside, Grand Junction is a little over 250 miles South-Southwest of Boulder, and West of the Rocky Mountains. Therefore, this analysis will have some inaccuracies built into that locational uncertainty.

There are several conclusions that can be drawn from the data in the Skew-T diagram below. Firstly, macroscopically, the balloon's tracer lines seem show quite stable air conditions as the sensor rises in elevation. In the Skew-T for my Clouds 1 report heavy cumulonimbus formations were apparent from frequent and severe lateral changes in the trendline from the balloon. However, in the Skew-T diagram for 10/25/22, we see a rather smooth trendline, following the saturation mixing ration. The one exception seems to be an small event between 3,500 and 5,500 meters, and even smaller irregularity between 8,500 and 9,300 meters. The existence of these irregularities in

these locations furthers the aforementioned identification of stratus, cirrostratus, and cirrus clouds.

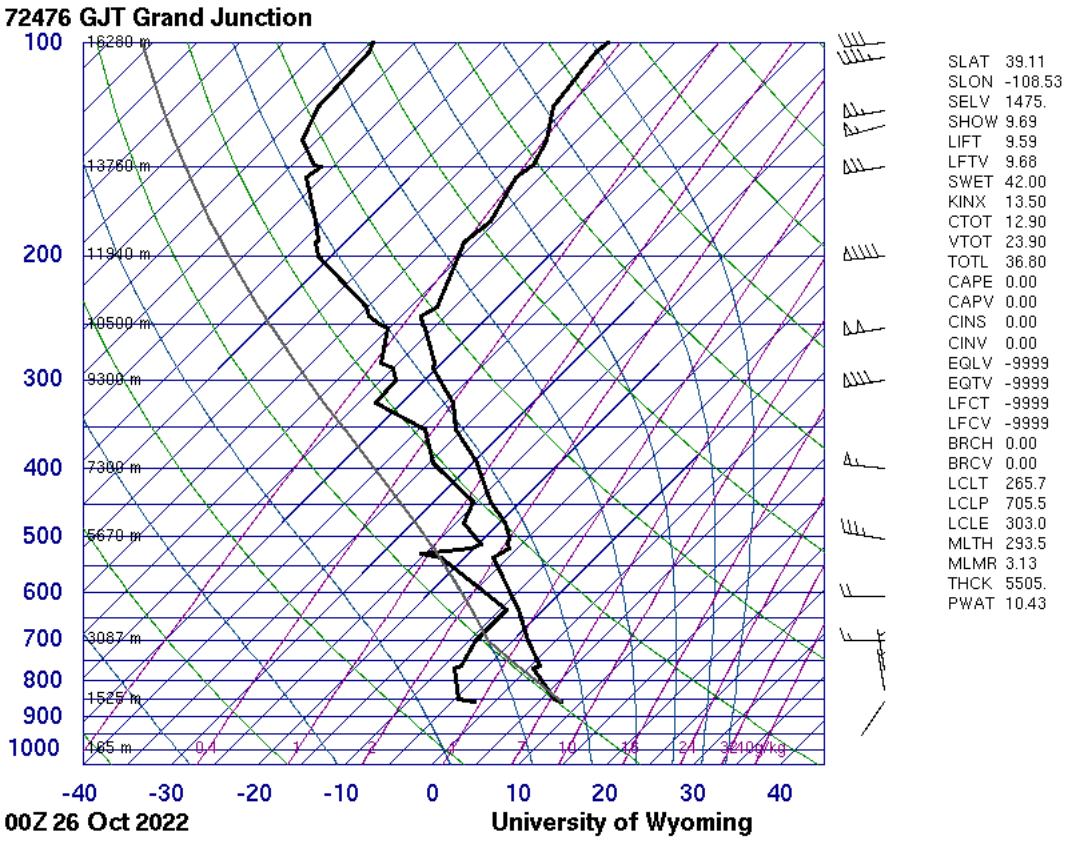


*Figure 1: Skew-T diagram from a weather balloon over Grand Junction, Colorado on 10/25/22* [1]

## Camera Settings:

I used an iPhone X the clouds for this assignment. *Table 1* below contains further logistical information concerning camera settings and site conditions.

| Spec | Description |
|---|---|
| Camera Type | iPhone X |
| Field of View | 2000’ x 750’ |
| Distance from Object to Lens | ~100’ |
| Focal Length | 4.25mm |
| Aperture | f/1.8 |
| ISO | 32 |
| Shutter Speed | 1/167” |
| Resolution | 4032 x 3024 |

[1] https://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=GIF%3ASKEWT&YEAR=2022&MONTH=10&FROM=0400&TO=0400&STNM=72476

*Table 1: Camera settings and lens specs*

This photo was taken with an iPhone X, shot in Apple's lossless HEIC format. The resolution of the initial and edited photo is 4032 x 3024. Like my Clouds 1 report, I felt that cropping constituent elements in the photo would detract from the overall composition. While the apartment building and deck elements do not add anything in terms of flow visualization, I feel they in fact contribute to the overall composition.

Unlike all of my other reports, where I opted to use Adobe CC post-production software, I used Apple's *Photos* application to edit this photo. I made several revisions to the photo in order to increase the contrast between the cloud itself, the sky, and the surrounding elements. Additionally, I hoped to increase the color vibrancy and saturation, to highlight the dramatic colors found in the photo. See Table 2 for the exact revisions made in *Photos*.

| Parameter | Revision Value |
|---|---|
| Exposure | + 0.03 |
| Highlights | - 0.17 |
| Shadows | + 0.19 |
| Brightness | + 0.15 |
| Contrast | + 0.14 |
| Saturation | + 0.06 |
| Vibrance | + 0.03 |

*Table 2: Changes in photo parameters from* Photos *app*

## Conclusions:

This particular photo was truly a product of incidence. In one sense that's great because of its personal convenience to me, in another sense it is quite frustrating because such a situation makes the photo hard to replicate. Regardless, I am really satisfied with the color and composition of the photo, and believe it shows a great transition from the cirrus to the stratus formation. If I were to replicate this experiment, I would attempt to improve the overall composition of the photo. While I enjoy the accessory elements in the frame, in retrospect I would have preferred a more intentional inclusion of these elements.