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MCEN 5151

10/25/21

Clouds 1



Cumulus Humilis Clouds

1. **Purpose:** For the first Cloud assignment, I wanted to try to capture clouds that were not only interesting but also colorful in some way to showcase some of the beauty that can be found in them. I had taken several photos of many different clouds at different times, but I chose this one because of their simplicity, color, and lack of distracting objects in the foreground or background. I have always enjoyed colorful, puffy clouds, but I wanted to learn what weather patterns create them so that in the future I may be able to photograph more.

2. **Circumstances:**

Circumstances Overview

- **Location:** Boulder, CO - 39.938782, -105.236474
- **Direction and Elevation:** ~SW & ~51 degrees from horizontal
- **Date/Time:** August 23, 2021 – 7:42PM

3. **Cloud Analysis:** Based upon the data, I believe that these are Cumulus Humilis clouds. By examining the Skew-T chart in Figure 1 below, these clouds most likely formed between 4000m and 6000m, as this is where the dewpoint plot line and environmental sounding line are the closest. This would be relatively high altitude for these types of clouds, but due to Boulder's high elevation, the clouds proximity to the mountains at the Front Range, and the rising hot air nearby, the likelihood of these forming should increase (1). The CAPE value of 580.2 also indicates a weak instability in the atmosphere which could also have contributed to the cloud formation and slightly higher altitude. Outside of the Skew-T data, the sky was moderately clear at this time in the south and west directions with some more clouds forming in the east. The wind at this time was roughly WNW at 6.8 mph and the area was cooling off after a moderately hot day with a high of 91 degrees Fahrenheit (2). In general, the weather for this week at no large storms

or precipitation events, but August 23rd was the middle day of a 3-day heat wave where temperatures were above 90 degrees Fahrenheit compared to low 80s for all other days that week (2). Overall, all of these conditions and the time of year would lead to the formation of cumulus clouds, paired with the higher temperatures, Boulder's high elevation, and interfacing with the mountains, it can be assumed that these are Cumulus Humilis clouds with an above average altitude.

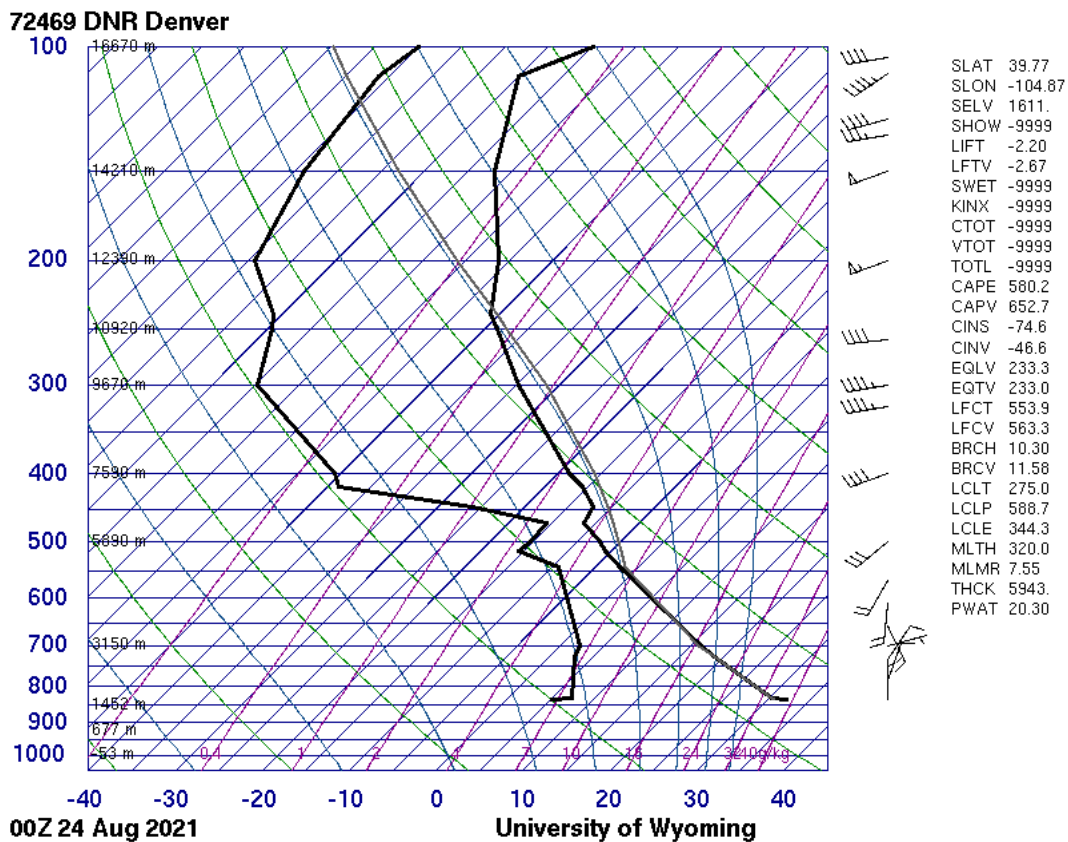


Figure 1: Skew T Diagram from Denver @ 00Z 24 Aug 2021

4. **Photographic Technique:** For this photo, I wanted something more than just a standard white cloud with a blue-sky background, so I chose an image that included nice, warm colors at sunset. I used my full frame Sony camera and zoom lens to adequately zoom into the clouds to eliminate any foreground distractions and maintain a good resolution for the final image. The aperture was set to f3.5 to get a little more sharpness and focus distance out of the lens but wasn't as big of a concern as the clouds were so far away.

With that the ISO was very low at 100 to retain a lot of accurate color and dynamic range information, but the shutter speed could remain a very fast 1/400. I did some post processing of this image in Lightroom, mainly just to raise the exposure and shadows a bit and just add a little more saturation. I did remove some of the mountain in the bottom right of the image in Photoshop because I felt that it was a distracting element in the photo.

Photographic Details Overview

- **FOV:** ~ 1100m x 667m
- **Object Distance:** ~6400m
- **Lens:** Tamron 28-75mm f2.8 @ 75mm
- **Camera:** Sony A7iii
- **Resolution:** 6000 x 4000 original, 4258 x 3406 Final
- **Aperture:** f3.5
- **Shutter Speed:** 1/400
- **ISO:** 100



Figure 4: RAW Image



Figure 5: Raw Image vs Final Image

5. **Self-Assessment:** This image shows what types of clouds can form in these conditions, but also how a higher elevation, dry climate, and mountain interference can alter some of the traits of clouds. I like that this image showcases some good color, with the pinks and oranges from sunset, and only captures the clouds in the final image. I would have liked to have had a better zoom lens to maybe focus on the details of one instead of the group, or had the clouds been slightly higher to not have to crop in so much, but the final image still does a good job at showing this specific cloud formation.

References:

1. "Clouds." Cloud Classification (Centre for Atmospheric Science - The University of Manchester), The University of Manchester,
<http://www.cas.manchester.ac.uk/resactivities/cloudphysics/background/classification/>.
2. "Past Weather in Boulder, Colorado, USA - Yesterday and Last 2 Weeks."
Timeanddate.com, <https://www.timeanddate.com/weather/usa/boulder/historic>.